

Taxon: Portulacaria afra	Family: Didiereaceae
Common Name(s): dwarf jade plant elephant bush miniature jade tree purslane tree	Synonym(s): Crassula portulacaria L.

Assessor: Chuck Chimera	Status: Approved	End Date: 1 Jul 2024
WRA Score: 6.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Succulent Shrub, Naturalized Elsewhere, Fire Resistant, Spreads Vegetatively, Rarely Seeds

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)	Intermediate
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	n
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	y = 1*multiplier (see Appendix 2), n = 0	n
303	Agricultural/forestry/horticultural weed	y = 2*multiplier (see Appendix 2), n = 0	n
304	Environmental weed		
305	Congeneric weed	y = 1*multiplier (see Appendix 2), n = 0	n
401	Produces spines, thorns or burrs	y = 1, n = 0	n
402	Allelopathic	y = 1, n = 0	n
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		
407	Causes allergies or is otherwise toxic to humans	y = 1, n = 0	n
408	Creates a fire hazard in natural ecosystems	y = 1, n = 0	n
409	Is a shade tolerant plant at some stage of its life cycle		

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	y
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		
604	Self-compatible or apomictic		
605	Requires specialist pollinators	y = -1, n = 0	n
606	Reproduction by vegetative fragmentation	y = 1, n = -1	y
607	Minimum generative time (years)		
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	n
704	Propagules adapted to wind dispersal	y = 1, n = -1	y
705	Propagules water dispersed		
706	Propagules bird dispersed		
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)	y = 1, n = -1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y = 1, n = -1	n
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
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	"There are cultivars with leaves variegated in white or yellow. These are much smaller and slower growing than the type and are quite attractive as potted plants and even better as large groundcovers for sunny sites." [Certain cultivars may be less prone to naturalization if they are slower growing, and smaller-statured]

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2024). 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"	Intermediate
	Source(s)	Notes
	Guralnick, L. J., & Ting, I. P. (1987). Physiological changes in <i>Portulacaria afra</i> (L.) Jacq. during a summer drought and rewatering. <i>Plant Physiology</i> , 85(2), 481-486.	" <i>Portulacaria afra</i> is a perennial, small leaf succulent, endemic to the Mediterranean climates of South Africa and shifts from C3 to CAM photosynthesis when grown outside during the summer despite irrigation"

202	Quality of climate match data	High
	Source(s)	Notes
	Guralnick, L. J., & Ting, I. P. (1987). Physiological changes in <i>Portulacaria afra</i> (L.) Jacq. during a summer drought and rewatering. <i>Plant Physiology</i> , 85(2), 481-486.	" <i>Portulacaria afra</i> is a perennial, small leaf succulent, endemic to the Mediterranean climates of South Africa and shifts from C3 to CAM photosynthesis when grown outside during the summer despite irrigation"

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"Natural stands occur on a wide range of soils from near sea level to over 1,000 m, in rainfall belts of 25 to 75 cm" [elevation range >1000 m, demonstrating environmental versatility]

204	Native or naturalized in regions with tropical or subtropical climates	n
	Source(s)	Notes
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2024). Plants of Hawai'i. http://www.plantsofhawaii.org . [Accessed 25 Jun 2024]	"Only found in cultivation" [No evidence to date]

Qsn #	Question	Answer
	Guralnick, L. J., & Ting, I. P. (1987). Physiological changes in <i>Portulacaria afra</i> (L.) Jacq. during a summer drought and rewatering. <i>Plant Physiology</i> , 85(2), 481-486.	" <i>Portulacaria afra</i> is a perennial, small leaf succulent, endemic to the Mediterranean climates of South Africa..."
	Charles Darwin Foundation. (2024). Galapagos Species Database, <i>Portulacaria afra</i> ", dataZone. https://datazone.darwinfoundation.org/en/checklist/?species=1945 . [Accessed 25 Jun 2024]	[No evidence in Galapagos] "Mode of introduction: Intentional Introduction Pathway: Intentional Subpathway: Agriculture/Horticulture Introduced status: Human dependent Invasive status: Unlikely to become invasive Year of first record: 2004"
	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	[Not Singapore] " <i>Portulacaria afra</i> (L.) Jacq.; Portulacaceae; cultivated only"

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Whistler, W.A. (2000). <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"...widely cultivated in the tropics and subtropics for its attractive succulent leaves, reminiscent of pieces of jade."
	Staples, G.W. & Herbst, D.R. (2005). <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"Miniature jade tree is grown as a houseplant the world over, and in tropical areas it is also used outdoors as a high ground cover unclipped hedge or screen, or specimen plant."
	Hankey, A. & Sisulu, W. (2009). <i>Portulacaria afra</i> . South African National Biodiversity Institute. Revised May 2009. https://pza.sanbi.org/portulacaria-afra . [Accessed 25 Jun 2024]	" <i>Portulacaria afra</i> or Porkbush is a popular succulent garden plant in use around the world and is often used for bonsai. It has now been shown to be effective in carbon sequestration (binding atmospheric carbon which is responsible for climate change), in semi-arid landscapes and thicket vegetation it is also being used for restoration purposes."

301	Naturalized beyond native range	y
	Source(s)	Notes
	Hussey, B.M.J., Keighery, G. J., Dodd, J., Lloyd, S.G. & Cousens, R.D. (2007). <i>Western Weeds. A Guide to the Weeds of Western Australia</i> . The Weed Society of Western Australia, Victoria Park, WA	"A large infestation probably from dumped garden rubbish has been recorded near Kalgoorlie and is targeted for eradication, but others are likely to occur at similar sites. Potentially a serious weed in arid areas."
	Gallaher, T.J., Brock, K., Kennedy, B.H., Imada, C.T., Imada, K., & Walvoord, N. (2024). <i>Plants of Hawai'i</i> . http://www.plantsofhawaii.org . [Accessed 25 Jun 2024]	"Only found in cultivation" [No evidence in the Hawaiian Islands to date]
	Lohr, M. T., & Keighery, G. (2016). The status and distribution of naturalised alien plants on the islands of the west coast of Western Australia. <i>Conservation Science Western Australia</i> , 10: 1	" <i>Portulacaria afra</i> (dwarf jade plant) - Recorded on Rat Island in the Midwest Region from a WA Herbarium specimen collected in 2003. Popular ornamental that escapes cultivation via establishment of cuttings in dumped garden waste. The Rat Island population probably originated from ornamentals planted near fishing shacks. Prioritised as L (B, C, D) in the Midwest Region, but Hussey et al. (2007) caution that it could become a serious weed in arid areas."

Qsn #	Question	Answer
	Cerrato MD, Ribas-Serra A, Mir-Rosselló PM, Ametller CVC, Cortés- Fernández I, Perelló-Suau S, Fernández SP, Vives LG. (2023). Records of alien plants new for the Flora of The Balearic Islands (West-Mediterranean). <i>BiolInvasions Records</i> 12(4): 887-898	" <i>Portulacaria afra</i> Jacq. (Family: Didiereaceae) (Figure 2E) Formentera, Sant Francesc Xavier, 38°42'29.8"N; 01°25'45.4"E, Ribas-Serra A. (03/10/2022). Four individuals growing with <i>Agave</i> spp. and <i>Opuntia</i> spp. near a private state, invading a shrubland of <i>Juniperus phoenicea</i> , <i>Olea europaea</i> and <i>Pinus halepensis</i> . (Herbarium code LLGLGV4277). Native to the eastern part of South Africa, <i>Portulacaria afra</i> is an evergreen succulent shrub/tree with distinctive succulent round shaped leaves and red stems. Due to its flexibility for plant growth under various shapes and sizes, it is a widespread ornamental species. Invasiveness is limited since it has been recorded several times outside its native range usually as a casual species related to pruning wastes. The species has been recorded as casual in the Iberian Peninsula (Aymerich 2017), Canary Islands (Otto and Verloove 2016), Sicily (Pasta et al. 2017) and Australia (Gosper et al. 2015)."
	Charles Darwin Foundation. (2024). Galapagos Species Database, <i>Portulacaria afra</i> ", dataZone. https://datazone.darwinfoundation.org/en/checklist/?species=1945 . [Accessed 25 Jun 2024]	"Taxon introduced for agricultural or domestic use; not naturalized." [No evidence from Galapagos]
	Stajsic, V. (2024). Didiereaceae, in Phillip G. Kodela (ed.), <i>Flora of Australia</i> . Australian Biological Resources Study, Department of Climate Change, Energy, the Environment and Water: Canberra. https://profiles.ala.org.au/opus/foa/profile/Didiereaceae . [Accessed 25 Jun 2024]	"The family is represented in Australia by <i>Portulacaria afra</i> (naturalised in Western Australia, and sparingly established in Queensland)."
	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	[Not in Singapore] " <i>Portulacaria afra</i> (L.) Jacq.; Portulacaceae; cultivated only"

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Hussey, B.M.J., Keighery, G. J., Dodd, J., Lloyd, S.G. & Cousens, R.D. (2007). <i>Western Weeds. A Guide to the Weeds of Western Australia</i> . The Weed Society of Western Australia, Victoria Park, WA	[No impacts described] "Common as a drought tolerant garden plant. A large infestation probably dumped from garden rubbish has been recorded near Kalgoorlie and is targeted for eradication, but others are likely to occur at similar sites. Potentially a serious weed in arid areas."

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

304	Environmental weed	
	Source(s)	Notes

Qsn #	Question	Answer
	Brodie, C.J., Vonow, H.P., Canty, P.D., Lang, P.J., Kellermann, J. & Waycott, M. (2017). Regional Landscape Surveillance for New Weed Threats Project: A compilation of the annual reports on new plant naturalisations in South Australia 2010-2016. State Herbarium of South Australia: Adelaide	[Negative impacts in Australia not documented] "Portulacaria afra (L.) Jacq. Native to: South Africa. Distribution: In Australia recoded sparingly in Queensland and Western Australia. Worldwide: Commonly cultivated but not widely naturalised. Likes to grow in: In semi-arid landscapes. Description: Soft-wooded, semi-evergreen upright shrub to a maximum of about 4 m tall and wide, with rounded semi-succulent leaves. Collection details: First collected in 1991 at Port Augusta with several collections made around the State. Most recently collected in 2012."
	Cerrato MD, Ribas-Serra A, Mir-Roselló PM, Ametller CVC, Cortés- Fernández I, Perelló-Suau S, Fernández SP, Vives LG. (2023). Records of alien plants new for the Flora of The Balearic Islands (West-Mediterranean). <i>BiolInvasions Records</i> 12(4): 887-898	[Not regarded as an environmental weed] "Due to its flexibility for plant growth under various shapes and sizes, it is a widespread ornamental species. Invasiveness is limited since it has been recorded several times outside its native range usually as a casual species related to pruning wastes. The species has been recorded as casual in the Iberian Peninsula (Aymerich 2017), Canary Islands (Otto and Verloove 2016), Sicily (Pasta et al. 2017) and Australia (Gosper et al. 2015)."
	Hussey, B.M.J., Keighery, G. J., Dodd, J., Lloyd, S.G. & Cousens, R.D. (2007). <i>Western Weeds. A Guide to the Weeds of Western Australia</i> . The Weed Society of Western Australia, Victoria Park, WA	[Potentially] "A large infestation probably from dumped garden rubbish has been recorded near Kalgoorlie and is targeted for eradication, but others are likely to occur at similar sites. Potentially a serious weed in arid areas."

305	Congeneric weed	n
	Source(s)	Notes
	Hankey, A. & Sisulu, W. (2009). <i>Portulacaria afra</i> . South African National Biodiversity Institute. Revised May 2009. https://pza.sanbi.org/portulacaria-afra . [Accessed 25 Jun 2024]	[No evidence] "Other members of this genus include <i>Portulacaria armiana</i> and <i>Portulacaria pygmaea</i> the former has larger grey green leaves and is native to Namibia although it is not often cultivated, whereas the latter is a dwarf succulent shrublet with small, thickly fleshy, grey green leaves and occurs on rocky hillsides in Namaqualand, South Africa."
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"It is a straggling, much-branched shrub or small tree with succulent stems and leaves, 1 to 3 m high, with stem 30 to 80 cm in diameter. The plant is glabrous throughout, with opposite, smooth, short, articulate branches (Fig. 1). Abortive buds at nodes on weak branches often produce dichotomous growth. The small, flat, fleshy, deciduous leaves are borne on opposite, compressed, branched peduncles. The entire obovate leaves are 28-31 mm long and 18-22 mm wide, narrowed near the base."

402	Allelopathic	n
	Source(s)	Notes

Qsn #	Question	Answer
	Mills, A. J., & Cowling, R. M. (2006). Rate of carbon sequestration at two thicket restoration sites in the Eastern Cape, South Africa. <i>Restoration Ecology</i> , 14(1), 38-49	"The intact vegetation at both sites is known as spekboomveld, a form of arid succulent thicket (Vlok et al. 2003), and is characterized by a matrix of the succulent shrub <i>P. afra</i> , which is interspersed with spinescent shrubs such as Needle-bush (<i>Azima tetraacantha</i>), Hedge spikethorn (<i>Gymnosporia polyacantha</i>), False spikethorn (<i>Putterlickia pyracantha</i>), Three-leaved rhigozum (<i>Rhigozum obovatum</i>), and Spiny currant-rhus (<i>Rhus longispina</i>), and low-growing trees (<5 m) such as Jacket-plum (<i>Pappea capensis</i>), Common guarri (<i>Euclea undulata</i>), and Karoo boer-bean (<i>Schotia afra</i>)." [Despite thicket formations, <i>P. afra</i> occurs with several other species, and is being used to rehabilitate soil in formerly heavily browsed, and degraded landscapes in South Africa]
	Hankey, A. & Sisulu, W. (2009). <i>Portulacaria afra</i> . South African National Biodiversity Institute. Revised May 2009. https://pza.sanbi.org/portulacaria-afra . [Accessed 25 Jun 2024]	[No evidence] "Further to its carbon habit, the large spreading shrub covers and shades the soil from the harmful rays of the sun creating a favourable environment under the bush for insects and other wildlife to inhabit, while the dead organic matter which accumulates under the bushes has an enriching effect on the soil. This further enrichment of the soil improves its water-holding capacity which further benefits the porkbush as well as other plants and animals including micro-organisms, which occur in the area."

403	Parasitic	n
	Source(s)	Notes
	Van Wyk, B. & van Wyk, P. (2007). <i>How to Identify Trees in Southern Africa</i> . Struik Publishers, Cape Town, South Africa	"Shrub or small tree..." [Portulacaceae, or Didiereaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"One of the most valuable South African fodder trees is <i>Portulacaria afra</i> Jacq. This large shrub or small tree is included in the list of fodder trees of South Africa by Palmer and Pitman (1961)...The plant is browsed by wild animals and by all types of livestock; cattle and goats, in particular, like it. It is reported to serve as a source of ostrich feed on farms in the Cape Province."
	Suttie, J. M., Reynolds, S. G., & Batello, C. (Eds.). (2005). <i>Grasslands of the World. Plant production and protection series No. 34</i> . FAO, Rome, Italy	" <i>Portulacaria afra</i> ... susceptible to excessive browsing by goats and cattle."

405	Toxic to animals	n
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"Current consensus indicates that the value of the plant for fodder precludes its use as a source of paper pulp. The small rose-colored flower serves as a source of honey and it is reported by Sim (1907) to be of excellent quality ... The plant is browsed by wild animals and by all types of livestock; cattle and goats, in particular, like it. It is reported to serve as a source of ostrich feed on farms in the Cape Province." [No evidence]
	Davis, S. (2007). <i>Endozoochory in the subtropical thicket: comparing effects of species with different digestive systems on seed fate</i> . MSc. Thesis. Nelson Mandela Metropolitan University, Port Elizabeth, South Africa	" <i>P. afra</i> on the other hand, being highly nutritious and having no thorns and weak chemical defences, tolerates herbivory damage by indigenous herbivores by being able to reproduce vegetatively (Stuart-Hill 1991)."

406	Host for recognized pests and pathogens	
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Qsn #	Question	Answer
	Source(s)	Notes
	Dehgan, B. (2023). Garden Plants Taxonomy: Volume 2: Angiosperms (Eudicots). Springer Nature, Cham, Switzerland	"no serious pests or diseases reported other than root rot as a result of over watering"
	Hawaiian Ecosystems at Risk. (2005). Pathogens of plants of Hawaii - Hosts - <i>Portulacaria afra</i> . http://www.hear.org/pph/hosts/3448.htm . [Accessed 25 Jun 2024]	[Possibly] "Pathogens ... <i>Helicotylenchus</i> sp. - Spiral nematode ... <i>Meloidogyne Incognita</i> - Root-knot nematode ... <i>Rhizoctonia</i> sp. - <i>Rhizoctonia</i> ... <i>Scutellonema brachyurum</i> - Nematode"

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Schmidt, E., Lötter, M. & McClelland, W. (2002). Trees and shrubs of Mpumalanga and Kruger National Park. Jacana Media, Johannesburg, South Africa	"Leaves edible and eaten by children, and by lactating mothers when their milk diminishes." [No evidence]
	Hankey, A. & Sisulu, W. (2009). <i>Portulacaria afra</i> . South African National Biodiversity Institute. Revised May 2009. https://pza.sanbi.org/portulacaria-afra . [Accessed 25 Jun 2024]	"The leaves of the Porkbush can be eaten and have a sour or tart flavour. It is heavily browsed by game and domestic stock and highly favoured by tortoises. The Porkbush has also been indicated as a soil binder for preventing soil erosion. Traditional uses also include the increasing of breast milk by lactating mothers. The leaves are used to quench thirst, sucking a leaf is used to treat exhaustion, dehydration and heat stroke. Crushed leaves can be rubbed on blisters and corns on the feet to provide relief. The leaves are chewed as a treatment for sore throat and mouth infections while the astringent juice is used for soothing ailments of the skin such as pimples, rashes and insect stings. The juice is also used as an antiseptic and as a treatment for sunburn. It is also recorded that a small sprig of Porkbush steamed with a tomato bredie (stew) imparts a delicious flavour. The honey made from the flowers of Porkbush is said to be "unsurpassable in flavour and texture" by one reference (Roberts 1990)."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"The wide utilization of the plant is reported from Africa (Jardin, 1967; Palmer and Pitman, 1961; Uphof, 1968). Jardin (1967) indicates that it is an uncommon food plant in South Africa. The flat, fleshy, juicy leaves have a pleasant, acrid flavor and are eaten by the natives of Zululand (Palmer and Pitman, 1961)."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Van Jaarsveld, E. (2013). <i>Waterwise Gardening in South Africa and Namibia</i> . Penguin Random House South Africa, Cape Town, SA	"Fire-resistant hedges Shrubby succulents are generally drought-resistant and can make excellent fire barriers. Most of these shrubs, including Spekboom or Pork bush (<i>Portulacaria afra</i>), Kerkey-bush (<i>Crassula ovata</i>) and the many forms of Krantz aloe (<i>Aloe arborescens</i>), grow to approximately two metres in height. (Other shrub-like aloes are also suitable, but the Krantz aloe grows rapidly, reproduces easily and the branches can be planted in situ.)"
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"It is a straggling, much-branched shrub or small tree with succulent stems and leaves, 1 to 3 m high, with stem 30 to 80 cm in diameter." [Succulent plant unlikely to burn]
	Davis, S. (2007). Endozoochory in the subtropical thicket: comparing effects of species with different digestive systems on seed fate. MSc. Thesis. Nelson Mandela Metropolitan University, Port Elizabeth, South Africa	"The larger succulents present in many thicket types, especially <i>P. afra</i> , help to retard recurrent fires and promote thicket consolidation (Vlok et al. 2003)."

409	Is a shade tolerant plant at some stage of its life cycle	

Qsn #	Question	Answer
	Source(s)	Notes
	Dehgan, B. (2023). Garden Plants Taxonomy: Volume 2: Angiosperms (Eudicots). Springer Nature, Cham, Switzerland	"Full sun, in very well-drained, minimally fertile soils"
	Riffle, R.L. (1998). The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	"It relishes full sun and heat and withstands temperatures to about 30° F..."
	Hankey, A. & Sisulu, W. (2009). <i>Portulacaria afra</i> . South African National Biodiversity Institute. Revised May 2009. https://pza.sanbi.org/portulacaria-afra . [Accessed]	"This versatile plant can be used in full sun or semi-shade in dry areas or even in well-watered flowerbeds."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Whistler, W.A. (2000). Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"It is adaptable to most soils and is drought resistant but does best in moderately fertile, well-drained soils in sunny or partially shaded places."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	"Natural stands occur on a wide range of soils from near sea level to over 1,000 m, in rainfall belts of 25 to 75 cm"
	Mills, A. J., Cowling, R. M., Steyn, D., Spekreijse, J., Van den Broeck, D., Weel, S., & Boogerd, C. (2011). <i>Portulacaria afra</i> is constrained under extreme soil conditions in the Fish River Reserve, Eastern Cape, South Africa. South African Journal of Botany, 77(3), 782-786	"P. afra is tolerant of a wide range of soil conditions and is unlikely to be constrained directly by any of the soil properties analysed."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	"It is a straggling, much-branched shrub or small tree with succulent stems and leaves, 1 to 3 m high, with stem 30 to 80 cm in diameter. The plant is glabrous throughout, with opposite, smooth, short, articulate branches (Fig. 1). Abortive buds at nodes on weak branches often produce dichotomous growth. The small, flat, fleshy, deciduous leaves are borne on opposite, compressed, branched peduncles. The entire obovate leaves are 28-31 mm long and 18-22 mm wide, narrowed near the base."

412	Forms dense thickets	y
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	"Dense natural stands occur in the southeastern Cape Province, often covering whole mountain slopes according to Batten and Bokelmann (1966). The dominance of spekboom in the dense shrub of portions of the eastern and southern Cape is recognized as a vegetation type; i.e., "spekboomveld" by Acocks (1953)...The plants occur in dense stands in their natural state and possess good ground cover and soil-binding properties."
	Adie, H. R. (1997). Vegetation and ant dynamics in the southern Karoo. PhD Dissertation. Department of Botany, University of Natal, Pietermaritzburg	" <i>Portulacaria afra</i> displaces its nurse plant, <i>R. obovatum</i> , by competitive interaction. The densely packed stems and leaves of <i>P. afra</i> shade woody shrubs growing within the clump unless the shrub maintains its canopy above the <i>P. afra</i> clump."

Qsn #	Question	Answer
501	Aquatic	n
	Source(s)	Notes
	Van Wyk, B. & van Wyk, P. (2007). How to Identify Trees in Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree, occurring in bushveld and thicket, often in dense stands and dominant over large areas." [terrestrial]
502	Grass	n
	Source(s)	Notes
	Van Wyk, B. & van Wyk, P. (2007). How to Identify Trees in Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree..." [Portulacaceae, or Didiereaceae]
503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Van Wyk, B. & van Wyk, P. (2007). How to Identify Trees in Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree..." [Portulacaceae, or Didiereaceae]
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Van Wyk, B. & van Wyk, P. (2007). How to Identify Trees in Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree..." [Portulacaceae, or Didiereaceae]
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	[No evidence] "Prolific seed production is characteristic of natural stands although seed germination is somewhat difficult under controlled conditions. Repeated attempts to germinate the seed in the laboratory have been unsuccessful. Contrarily, numerous seedlings occur under mother trees in natural stands."

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	Whistler, W.A. (2000). Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"Flowers rarely in cultivation, in spring in its native habitat ... Fruit a small three-winged capsule, infrequently formed in cultivation."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	"The plant forms few seeds in comparison to the number of flowers produced (Sim, 1907). Reports indicate that the plant is rarely propagated by seed but rather by cuttings (Palmer and Pitman, 1961; Sim, 1907)."
	Venter, H. M., Wolfson, M. M., & Avenant, P. (1993). Research note: A preliminary study of sexual reproduction in <i>Portulacaria afra</i> . African Journal of Range & Forage Science 10(1): 63-65	"The sexual reproductive system of <i>Portulacaria afra</i> is characterized by the occurrence of gynodioecy; hermaphrodite and female plants occur in approximately equal proportions in all the populations studied. Female plants produce large quantities of viable seed whilst seed production in the hermaphrodite plants is limited. These modifications in the methods of sexual reproduction may have important implications for the future survival of this species."

603	Hybridizes naturally	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown. No evidence found

604	Self-compatible or apomictic	
	Source(s)	Notes
	Venter, H. M., Wolfson, M. M., & Avenant, P. (1993). Research note: A preliminary study of sexual reproduction in <i>Portulacaria afra</i> . African Journal of Range & Forage Science 10(1): 63-65	[Unknown] "The sexual reproductive system of <i>Portulacaria afra</i> is characterized by the occurrence of gynodioecy; hermaphrodite and female plants occur in approximately equal proportions in all the populations studied. Female plants produce large quantities of viable seed whilst seed production in the hermaphrodite plants is limited. These modifications in the methods of sexual reproduction may have important implications for the future survival of this species."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Roubik, D.W. (1995). Pollination of cultivated plants in the tropics. FAO Services Bulletin 118. FAO, Rome, Italy	"No. 1042... <i>Portulacaria afra</i> ...Pollinators...bee"
	Mills, A. J., Cowling, R. M., Steyn, D., Spekrijse, J., Van den Broeck, D., Weel, S., & Boogerd, C. (2011). <i>Portulacaria afra</i> is constrained under extreme soil conditions in the Fish River Reserve, Eastern Cape, South Africa. South African Journal of Botany, 77(3), 782-786	"Small star-shaped pink flowers are borne en masse from late winter to spring although flowering in cultivation is often erratic. They are a rich source of nectar for many insects, which in-turn attracts insectivorous birds."
	Du Toit, A., MacDonald, R., Steyn, E., Mahlanza, Z. P., Zulu, A. B., & De Wit, M. (2023). Review of the underutilized indigenous <i>portulacaria afra</i> (spekboom) as a sustainable edible food source. Agronomy, 13(5), 1206	"The flowers are rich in nectar, which lures bees, other insects, and songbirds to pollinate the plant [20,46]. Fascicles of these flowers are borne towards the end of the branches producing nectar that attracts bees [71]."

606	Reproduction by vegetative fragmentation	y
	Source(s)	Notes
	Davis, S. (2007). Endozoochory in the subtropical thicket: comparing effects of species with different digestive systems on seed fate. MSc. Thesis. Nelson Mandela Metropolitan University, Port Elizabeth, South Africa	"Many thicket plant species are capable of vegetative reproduction either through branches touching the ground and taking root (i.e.: <i>P. afra</i>) or from the suckers of both exposed and unexposed roots (La Cock 1992)."

Qsn #	Question	Answer
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"Reports indicate that the plant is rarely propagated by seed but rather by cuttings (Palmer and Pitman, 1961; Sim, 1907). Most all the plant parts root readily, especially the fleshy leaves and young branches...Cattle often cause serious damage when browsing the plants by breaking the plants off near ground level or tearing down the articulated branches. The ease with which the branches are torn off the plant aids in its dissemination."

607	Minimum generative time (years)	
	Source(s)	Notes
	Baran, R.J. (2024). "Portulacaria afra, the Elephant's Food or Spekboom: a monograph which contains some of the areas of both knowledge and ignorance pertaining to this plant". https://www.magiminiland.org/Portulacariab.html . [Accessed 1 Jul 2024]	[Unknown] "It is not known how old or large a plant must be in order to first flower."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y
	Source(s)	Notes
	Hussey, B.M.J., Keighery, G. J., Dodd, J., Lloyd, S.G. & Cousens, R.D. (2007). <i>Western Weeds. A Guide to the Weeds of Western Australia</i> . The Weed Society of Western Australia, Victoria Park, WA	"A large infestation probably from dumped garden rubbish has been recorded near Kalgoorlie and is targeted for eradication, but others are likely to occur at similar sites. Potentially a serious weed in arid areas." [Possible to be spread by dumped garden waste]

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Whistler, W.A. (2000). <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"...widely cultivated in the tropics and subtropics for its attractive succulent leaves, reminiscent of pieces of jade."
	Staples, G.W. & Herbst, D.R. (2005). <i>A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places</i> . Bishop Museum Press, Honolulu, HI	"Miniature jade tree is grown as a houseplant the world over, and in tropical areas it is also used outdoors as a high ground cover unclipped hedge or screen, or specimen plant."

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Whistler, W.A. (2000). <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	"Flowers rarely in cultivation, in spring in its native habitat ... Fruit a small three-winged capsule, infrequently formed in cultivation." [Produce contamination unlikely given rarity of seed production in cultivation]

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Adie, H., & Yeaton, R. I. (2014). Directed dispersal and decomposition drive cyclic succession in arid subtropical thicket. <i>Plant Ecology</i> , 215, 507-515	"Portulacaria afra produces super-abundant quantities of fruit in early spring. Wind is an effective primary dispersal mechanism of its 3-winged capsule and causes fruit to accumulate in extensive heaps adjacent to P. afra clumps and in nearby grass."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"The plant is disseminated by birds, rodents, and large animals. The seeds, leaves, and twigs adhere to the hides and particularly the hooves of large animals."

705	Propagules water dispersed	

Qsn #	Question	Answer
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"The plant is disseminated by birds, rodents, and large animals. The seeds, leaves, and twigs adhere to the hides and particularly the hooves of large animals."
	Musarella, C. M. et al. (2024). An Update on the Introduction of New Alien Plant Taxa for Italy and Europe. <i>Plants</i> , 13, 620	[Possibly moved along a water drainage channel] " <i>Portulacaria afra</i> Jacq. Didiereaceae–Neophyte–Kenya, Mozambique and South Africa–Succulent phanerophyte First record for peninsular Italy (casual alien) Specimen: 14 August 2023, Reggio Calabria, inside the water drainage channel along the A2 motorway junction, towards Salerno, 38.125144N-15.653063E, 13 m a.s.l., leg. C.M. Musarella, det. V.L.A. Laface, C.M. Musarella, G. Spampinato (REGGIO). Note. Several individuals of <i>Portulacaria afra</i> were found in a water drainage channel, among other several alien species. They were probably formed from leaves and broken twigs of plants grown on the balconies and terraces of the many apartments that line the motorway junction."

706	Propagules bird dispersed	
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	[Possibly externally dispersed by birds] "The plant is disseminated by birds, rodents, and large animals. The seeds, leaves, and twigs adhere to the hides and particularly the hooves of large animals."

707	Propagules dispersed by other animals (externally)	y
	Source(s)	Notes
	Adie, H., & Yeaton, R. I. (2014). Directed dispersal and decomposition drive cyclic succession in arid subtropical thicket. <i>Plant Ecology</i> , 215, 507-515	" <i>Portulacaria afra</i> fruit is secondarily dispersed by <i>M. capensis</i> to nest sites located beneath woody shrubs."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"The plant is disseminated by birds, rodents, and large animals. The seeds, leaves, and twigs adhere to the hides and particularly the hooves of large animals."

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. <i>Economic Botany</i> , 413-416	"The plant is disseminated by birds, rodents, and large animals. The seeds, leaves, and twigs adhere to the hides and particularly the hooves of large animals." [External dispersal is documented]
	Adie, H., & Yeaton, R. I. (2014). Directed dispersal and decomposition drive cyclic succession in arid subtropical thicket. <i>Plant Ecology</i> , 215, 507-515	"Vertebrates are not known to harvest <i>P. afra</i> fruit and, amongst ant species, only <i>M. capensis</i> appears large enough to manipulate the fruit (6.9–4 mm)." [No evidence]

Qsn #	Question	Answer
801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Whistler, W.A. (2000). Tropical Ornamentals: A Guide. Timber Press, Portland, OR	"Flowers rarely in cultivation, in spring in its native habitat ... Fruit a small three-winged capsule, infrequently formed in cultivation."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	"The 3-winged fruit is membranous, transparent, indehiscent, with a single erect seed (Batten and Bokelmann, 1966). The plant forms few seeds in comparison to the number of flowers produced"
	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	Since flowers are rare in cultivation, propagation is usually by stem cuttings, which are rooted in sand or vermiculite after allowing the cut ends to dry and form callus."
802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Weatherall-Thomas, C.R. 2009. Seed Dynamics and Seedling Survival in Mainland Thicket of the Eastern Cape. MSc. Thesis. Nelson Mandela Metropolitan University, Port Elizabeth, South Africa	" <i>Portulacaria afra</i> seeds lose viability after only a few months (Whiting 1991, Pierce & Cowling 1991). Sigwela (2004) suggests that most Thicket species have recalcitrant seeds, as few are found in the seed bank."
803	Well controlled by herbicides	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown. No information available on chemical control of or herbicide efficacy on this species.
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Hankey, A. & Sisulu, W. (2009). <i>Portulacaria afra</i> . South African National Biodiversity Institute. Revised May 2009. https://pza.sanbi.org/portulacaria-afra . [Accessed 1 Jul 2024]	"Elephants eat the plant from the top downwards allowing the plant to spread itself vegetatively by spreading horizontal branches at ground level. Outside the park the plants are eaten by goats who eat the plant from ground level upwards preventing the plant from spreading vegetatively."
	Oakes, A. J. (1973). <i>Portulacaria afra</i> Jacq.: a potential browse plant. Economic Botany, 413-416	"The plant is subject to repeated damage by browsing animals, although it has a remarkable capacity to rejuvenate itself following such damage"
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	WRA Specialist. (2024). Personal Communication	Unknown

Summary of Risk Traits:

Portulacaria afra is a straggling, much-branched shrub or small tree with succulent stems and leaves, 1 to 3 m high. Native to the Mediterranean climates of South Africa, it has been widely used as a houseplant, and in tropical areas is grown outdoors as a high ground cover, unclipped hedge or screen, or specimen plant. It can spread by wind dispersed seeds which are rarely produced in cultivation and may be more likely to be spread vegetatively by dumped garden waste, branches touching the ground, or by root suckers. It has naturalized in Australia where there is concern that it could become a weed in arid regions. It has not been documented as naturalized in the Hawaiian Islands to date, and because of its ability to resist fire, may be useful as a fuel break in fire prone areas of the islands.

High Risk / Undesirable Traits

- Broad elevation range
- Naturalized in Australia and perhaps elsewhere
- A possible weed of arid regions in Australia
- Tolerates many soil types
- Forms dense stands within native range
- Reproduces by seeds (rarely in cultivation) and vegetatively by rooting branches and suckers
- Seeds, when produced, dispersed by wind and externally by ants and other animals, as well as through intentional cultivation
- Vegetative fragments spread in dumped garden waste, attached to animals, and through intentional cultivation
- Tolerates and resprouts after browsing, and other physical damage, and is resistant to fire

Low Risk Traits

- Negative impacts have not been documented to date.
- Unarmed (no spines, thorns, or burrs)
- Highly palatable to browsing animals
- Non-toxic
- Grows best in high light environments (dense shade may inhibit spread)
- Fire resistant
- Limited flowering and fruiting in cultivation may reduce accidental or long-distance dispersal

Second Screening Results for Trees/tree-like shrubs

(A) Shade tolerant or known to form dense stands? Yes. Forms dense stands in native range.

(B) Bird- Or clearly wind- dispersed?> Yes. Wind-dispersed (when seeds are produced).

(C) Life cycle <4 years? Unknown

Outcome = Evaluate

