

Family: *Didiereaceae*

Taxon: *Portulacaria afra*

Synonym: *Crassula portulacaria L.*

Common Name: elephant bush
Dwarf Jade Plant
purslane tree

Questionnaire :	current 20090513	Assessor:	Chuck Chimera	Designation: EVALUATE
Status:	Assessor Approved	Data Entry Person:	Chuck Chimera	WRA Score 5
101	Is the species highly domesticated?		y=-3, n=0	n
102	Has the species become naturalized where grown?		y=1, n=-1	
103	Does the species have weedy races?		y=1, n=-1	
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		n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed		n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed		n=0, y = 2*multiplier (see Appendix 2)	
305	Congeneric weed		n=0, y = 1*multiplier (see Appendix 2)	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		y=1, n=0	
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		y=1, n=0	
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	y=1, n=-1	
604	Self-compatible or apomictic	y=1, n=-1	
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	
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	n
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	y
708	Propagules survive passage through the gut	y=1, n=-1	
801	Prolific seed production (>1000/m2)	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	y=-1, n=1	
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)	y=-1, n=1	

Designation: EVALUATE

WRA Score 5

Supporting Data:

101	1998. Riffle, R.L.. The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	[Is the species highly domesticated? No] "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-startured]
102	2011. WRA Specialist. Personal Communication.	NA
103	2011. WRA Specialist. Personal Communication.	NA
201	1987. Guralnick, L.J./Ting, I.P.. Physiological Changes in <i>Portulacaria afra</i> (L.) Jacq. during a Summer Drought and Rewatering. Plant physiology. 85: 481-486.	[Species suited to tropical or subtropical climate(s) 1-intermediate] " <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	1987. Guralnick, L.J./Ting, I.P.. Physiological Changes in <i>Portulacaria afra</i> (L.) Jacq. during a Summer Drought and Rewatering. Plant physiology. 85: 481-486.	[Quality of climate match data 2-high] " <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	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Broad climate suitability (environmental versatility)? Yes] "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	1987. Guralnick, L.J./Ting, I.P.. Physiological Changes in <i>Portulacaria afra</i> (L.) Jacq. during a Summer Drought and Rewatering. Plant physiology. 85: 481-486.	[Native or naturalized in regions with tropical or subtropical climates? No] " <i>Portulacaria afra</i> is a perennial, small leaf succulent, endemic to the Mediterranean climates of South Africa..."
204	2005. Wagner, W.L./Herbst, D.R./Lorence, D.H.. Flora of the Hawaiian Islands website. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm	[Native or naturalized in regions with tropical or subtropical climates? No] No evidence in Hawaiian Islands
204	2009. Chong, K.Y./Tan, H.T.W./Corlett, R.T.. 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	[Native or naturalized in regions with tropical or subtropical climates? Not Singapore] " <i>Portulacaria afra</i> (L.) Jacq.; Portulacaceae; cultivated only"
204	2011. The Charles Darwin Foundation. Galapagos Species Checklist - <i>Portulacaria afra</i> . http://www.darwinfoundation.org/datazone/checklists/vascular-plants/magnoliophyta/portulacaria-afra-l-jacq/n.org/datazone/checklists/vascular-p	[Native or naturalized in regions with tropical or subtropical climates? No] "Taxon introduced for agricultural or domestic use; not naturalized." [No evidence from Galapagos]
205	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	[Does the species have a history of repeated introductions outside its natural range?? Yes] "...widely cultivated in the tropics and subtropics for its attractive succulent leaves, reminiscent of pieces of jade."
205	2009. Hankey, A./Sisulu, W.. <i>Portulacaria afra</i> Jacq.. South African National Biodiversity Institute, http://www.plantzfrica.com/plantnop/portulacarafr a.htm	[Does the species have a history of repeated introductions outside its natural range? Yes] " <i>Portulacaria afra</i> or porkbush is a popular succulent garden plant in use around the world and is often used for bonsai."
301	2005. Wagner, W.L./Herbst, D.R./Lorence, D.H.. Flora of the Hawaiian Islands website. Smithsonian Institution, Washington, D.C. http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/index.htm	[Naturalized beyond native range? No] No evidence in Hawaiian Islands
301	2007. Hussey, B.M.J./Keighery, G. J./Dodd, J./Lloyd, S.G./Cousens, R.D.. Western Weeds. A Guide to the Weeds of Western Australia. The Weed Society of Western Australia, Victoria Park, WA	[Naturalized beyond native range? Yes] "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."

301	2009. Chong, K.Y./Tan, H.T.W./Corlett, R.T.. 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	[Naturalized beyond native range? Not in Singapore] "Portulacaria afra (L.) Jacq.; Portulacaceae; cultivated only"
301	2011. Australian Plant Name Index. Didiereaceae - Portulacaria afra. Integrated Botanical Information System (IBIS) Australian National Botanic Gardens Australian National Herbarium, http://www.anbg.gov.au/cgi-bin/apni?taxon_id=281034	[Naturalized beyond native range? Yes] "WA (naturalised), Qld (doubtfully naturalised)"
301	2011. The Charles Darwin Foundation. Galapagos Species Checklist - Portulacaria afra. http://www.darwinfoundation.org/datazone/checklists/vascular-plants/magnoliophyta/portulacaria-afra-l-jacq/n.org/datazone/checklists/vascular-p	[Naturalized beyond native range? No] "Taxon introduced for agricultural or domestic use; not naturalized." [No evidence from Galapagos]
302	2007. Randall, R.P.. Global Compendium of Weeds - Portulacaria afra [Online Database]. http://www.hear.org/gcw/species/portulacaria_afra/	[Garden/amenity/disturbance weed? No] No evidence
303	2007. Randall, R.P.. Global Compendium of Weeds - Portulacaria afra [Online Database]. http://www.hear.org/gcw/species/portulacaria_afra/	[Agricultural/forestry/horticultural weed? No] No evidence
304	2007. Hussey, B.M.J./Keighery, G. J./Dodd, J./Lloyd, S.G./Cousens, R.D.. Western Weeds. A Guide to the Weeds of Western Australia. The Weed Society of Western Australia, Victoria Park, WA	[Environmental weed? 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	2007. Randall, R.P.. Global Compendium of Weeds - Index [Online Database]. http://www.hear.org/gcw/	[Congeneric weed? No] No evidence
305	2009. Hankey, A./Sisulu, W.. Portulacaria afra Jacq.. South African National Biodiversity Institute, http://www.plantzafrika.com/plantnop/portulacaria.htm	[Congeneric weed? No] "Other members of this genus include Portulacaria armiana and Portulacaria pygmaea 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." [No evidence]
401	1973. Oakes, A.J.. Portulacaria afra Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Produces spines, thorns or burrs? No] "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	2006. Mills, A.J./Cowling, R.M.. Rate of Carbon Sequestration at Two Thicket Restoration Sites in the Eastern Cape, South Africa. Restoration Ecology. 14(1): 38-49.	[Allelopathic? No] "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 P. afra, which is interspersed with spinescent shrubs such as Needle-bush (Azima tetracantha), Hedge spikethorn (Gymnosporia polyacantha), False spikethorn (Putterlickia pyracantha), Three-leaved rhigozum (Rhigozum obovatum), and Spiny currant-rhus (Rhus longispina), and low-growing trees (<5 m) such as Jacket-plum (Pappea capensis), Common guarri (Euclea undulata), and Karoo boer-bean (Schotia afra)." [Despite thicket formations, P. afra occurs with several other species, and is being used to rehabilitate soil in formerly heavily browsed, and degraded landscapes in South Africa]
402	2009. Hankey, A./Sisulu, W.. Portulacaria afra Jacq.. South African National Biodiversity Institute, http://www.plantzafrika.com/plantnop/portulacaria.htm	[Allelopathic? No] "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	2007. Van Wyk, B./van Wyk, P.. How to Identify Trees in Southern Africa. Struik Publishers, Cape Town, South Africa	[Parasitic? No] "Shrub or small tree..." [Portulacaceae, or Didiereaceae]
404	1973. Oakes, A.J.. Portulacaria afra Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Unpalatable to grazing animals? No] "One of the most valuable South African fodder trees is Portulacaria afra 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."
404	2005. Suttie, J. M./Reynolds, S.G./Batello, C. (eds.). Grasslands of the world. Plant production and protection series No. 34. Food & Agriculture Org., Rome, Italy	[Unpalatable to grazing animals? No] "Portulacaria afra...susceptible to excessive browsing by goats and cattle."
405	1973. Oakes, A.J.. Portulacaria afra Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Toxic to animals? No] "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]
405	2007. Davis, S.. 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	[Toxic to animals? No] "P. afra 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	2005. Hawaiian Ecosystems at Risk. Pathogens of plants of Hawaii - Hosts - Portulacaria afra. http://www.hear.org/pph/hosts/3448.htm	[Host for recognized pests and pathogens? Possibly] "Pathogens ... Helicotylenchus sp. - Spiral nematode ... Meloidogyne Incognita - Root-knot nematode ... Rhizoctonia sp. - Rhizoctonia ... Scutellonema brachyurum - Nematode"
407	1973. Oakes, A.J.. Portulacaria afra Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Causes allergies or is otherwise toxic to humans? No] "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)."
407	2002. Schmidt, E./Lötter, M./McClelland, W.. Trees and shrubs of Mpumalanga and Kruger National Park. Jacana Media, Johannesburg, South Africa	[Causes allergies or is otherwise toxic to humans? No] "Leaves edible and eaten by children, and by lactating mothers when their milk diminishes." [No evidence]
407	2009. Hankey, A./Sisulu, W.. Portulacaria afra Jacq.. South African National Biodiversity Institute, http://www.plantzafrika.com/plantnop/portulacarafr a.htm	[Causes allergies or is otherwise toxic to humans? No] "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)."
408	1973. Oakes, A.J.. Portulacaria afra Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Creates a fire hazard in natural ecosystems? No] "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]
408	2007. Davis, S.. 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	[Creates a fire hazard in natural ecosystems? No] "The larger succulents present in many thicket types, especially P. afra, help to retard recurrent fires and promote thicket consolidation (Vlok et al. 2003)."
409	1998. Riffle, R.L.. The Tropical Look - An Encyclopedia of Dramatic Landscape Plants. Timber Press, Portland, OR	[Is a shade tolerant plant at some stage of its life cycle? Possibly] "It relishes full sun and heat and withstands temperatures to about 30° F..."

409	2009. Hankey, A./Sisulu, W.. <i>Portulacaria afra</i> Jacq.. South African National Biodiversity Institute, http://www.plantzafrica.com/plantnop/portulacarafr a.htm	[Is a shade tolerant plant at some stage of its life cycle? Possibly] "This versatile plant can be used in full sun or semi-shade in dry areas or even in well watered flowerbeds."
410	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Tolerates a wide range of soil conditions? Yes] "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"
410	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	[Tolerates a wide range of soil conditions? Yes] "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."
410	2011. Mills, A.J./Cowling, R.M./Steyn, D./Spekreijse, J./Van den Broeck, D./Weel, S./Boogerd, C.. <i>Portulacaria afra</i> is constrained under extreme soil conditions in the Fish River Reserve, Eastern Cape, South Africa. <i>South African J of Bot.</i> 77: 782–786.	[Tolerates a wide range of soil conditions? Yes] "P. <i>afra</i> is tolerant of a wide range of soil conditions and is unlikely to be constrained directly by any of the soil properties analysed."
411	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Climbing or smothering growth habit? No] "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	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Forms dense thickets? Yes] "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."
501	2007. Van Wyk, B./van Wyk, P.. <i>How to Identify Trees in Southern Africa</i> . Struik Publishers, Cape Town, South Africa	[Aquatic? No] "Shrub or small tree, occurring in bushveld and thicket, often in dense stands and dominant over large areas." [terrestrial]
502	2007. Van Wyk, B./van Wyk, P.. <i>How to Identify Trees in Southern Africa</i> . Struik Publishers, Cape Town, South Africa	[Grass? No] "Shrub or small tree..." [Portulacaceae, or Didiereaceae]
503	2007. Van Wyk, B./van Wyk, P.. <i>How to Identify Trees in Southern Africa</i> . Struik Publishers, Cape Town, South Africa	[Nitrogen fixing woody plant? No] "Shrub or small tree..." [Portulacaceae, or Didiereaceae]
504	2007. Van Wyk, B./van Wyk, P.. <i>How to Identify Trees in Southern Africa</i> . Struik Publishers, Cape Town, South Africa	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Shrub or small tree..." [Portulacaceae, or Didiereaceae]
601	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Evidence of substantial reproductive failure in native habitat? No] "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."
602	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Produces viable seed? Yes] "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)."
602	1993. Venter, H.M./Wolfson, M.M./Avenant, P.. Research note: A preliminary study of sexual reproduction in <i>Portulacaria afra</i> . <i>African Journal of Range & Forage Science</i> . 10(1): 63-65.	[Produces viable seed? Yes] "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."
602	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	[Produces viable seed? Yes] "Flowers rarely in cultivation, in spring in its native habitat ... Fruit a small three-winged capsule, infrequently formed in cultivation."
603	2011. WRA Specialist. Personal Communication.	[Hybridizes naturally? Unknown]

604	1993. Venter, H.M./Wolfson, M.M./Avenant, P.. Research note: A preliminary study of sexual reproduction in <i>Portulacaria afra</i> . African Journal of Range & Forage Science. 10(1): 63-65.	[Self-compatible or apomictic? 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	1995. Roubik, D.W.. Pollination of cultivated plants in the tropics. FAO Services Bulletin 118. FAO, Rome, Italy	[Requires specialist pollinators? No] "No. 1042... <i>Portulacaria afra</i> ...Pollinators...bee"
605	2011. Mills, A.J./Cowling, R.M./Steyn, D./Spekreijse, J./Van den Broeck, D./Weel, S./Boogerd, C.. <i>Portulacaria afra</i> is constrained under extreme soil conditions in the Fish River Reserve, Eastern Cape, South Africa. South African J of Bot. 77: 782-786.	[Requires specialist pollinators? No] "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."
606	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Reproduction by vegetative fragmentation? Yes] "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."
606	2007. Davis, S.. 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	[Reproduction by vegetative fragmentation? Yes] "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)."
607	2011. Baran, R.J.. "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". http://www.phoenixbonsai.com/Portulacaria.html	[Minimum generative time (years)? Unknown] "It is not known how old or large a plant must be in order to first flower. "
701	2007. Hussey, B.M.J./Keighery, G. J./Dodd, J./Lloyd, S.G./Cousens, R.D.. Western Weeds. A Guide to the Weeds of Western Australia. The Weed Society of Western Australia, Victoria Park, WA	[Propagules likely to be dispersed unintentionally? Yes] "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." [possibly to be spread by dumped garden waste]
702	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	[Propagules dispersed intentionally by people? Yes] " ...widely cultivated in the tropics and subtropics for its attractive succulent leaves, reminiscent of pieces of jade."
703	2000. Whistler, W.A.. Tropical Ornamentals: A Guide. Timber Press, Portland, OR	[Propagules likely to disperse as a produce contaminant? No] "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	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Propagules adapted to wind dispersal? No] "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	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Propagules water dispersed? No] "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." [No evidence, and plants not described as riparian species]
706	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Propagules bird dispersed? Yes] "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	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Propagules dispersed by other animals (externally)? Yes] "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	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. Economic Botany. 27(4): 413-416.	[Propagules survive passage through the gut? Unknown] "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, but unknown if seeds or plant parts survive passage through gut]

801	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Prolific seed production (>1000/m ²)? No] "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"
801	2000. Whistler, W.A.. <i>Tropical Ornamentals: A Guide</i> . Timber Press, Portland, OR	[Prolific seed production (>1000/m ²)? No] "Flowers rarely in cultivation, in spring in its native habitat ... Fruit a small three-winged capsule, infrequently formed in cultivation."
801	2011. Baran, R.J.. "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". http://www.phoenixbonsai.com/Portulacaria.html	[Prolific seed production (>1000/m ²)? No] "In South Africa <i>P. afra</i> bears these star shaped flowers in late spring and summer after the rains, but seldom blooms in the western U.S., Hawaii, or Florida. The flowers are rare in cultivation, but if kept very dry the older [and presumably unpruned] plants may flower after rain."
802	2009. Weatherall-Thomas, C.R.. Seed Dynamics and Seedling Survival in Mainland Thicket of the Eastern Cape. MSc. Thesis. Nelson Mandela Metropolitan University, Port Elizabeth, South Africa	[Evidence that a persistent propagule bank is formed (>1 yr)? No] "Portulacaria afra 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	2011. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information available on chemical control of or herbicide efficacy on this species.
804	1973. Oakes, A.J.. <i>Portulacaria afra</i> Jacq.: A Potential Browse Plant. <i>Economic Botany</i> . 27(4): 413-416.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "The plant is subject to repeated damage by browsing animals, although it has a remarkable capacity to rejuvenate itself following such damage"
804	2009. Hankey, A./Sisulu, W.. <i>Portulacaria afra</i> Jacq.. South African National Biodiversity Institute, http://www.plantzafrica.com/plantnop/portulacarafa.htm	[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "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."
805	2011. WRA Specialist. Personal Communication.	[Effective natural enemies present locally? Unknown]