

Taxon: <i>Syzygium cordatum</i>	Family: Myrtaceae
Common Name(s): umdoni water berry watertree waterwood	Synonym(s): Jambosa cymifera E.Mey. S. cordatum subsp. cordatum Syzygium cordifolium Klotzsch Syzygium cymiferum (E.Mey.) C.Presl

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 29 Oct 2015
WRA Score: 5.0	Designation: EVALUATE	Rating: Evaluate

Keywords: Naturalized, Tropical Tree, Pure Stands, Edible Fruit, Bird-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	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	n
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		
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	n
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
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

Qsn #	Question	Answer Option	Answer
409	Is a shade tolerant plant at some stage of its life cycle		
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	n
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		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)		
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	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		
706	Propagules bird dispersed	y=1, n=-1	y
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	y
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
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Protas 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	No evidence

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
	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 27 Oct 2015]	"Native: AFRICA East Tropical Africa: Kenya; Tanzania; Uganda West-Central Tropical Africa: Burundi; Rwanda; Zaire South Tropical Africa: Angola; Malawi; Mozambique; Zambia; Zimbabwe Southern Africa: Botswana; South Africa - Eastern Cape, KwaZulu-Natal, Limpopo, Mpumalanga; Swaziland"

202	Quality of climate match data	High
	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 27 Oct 2015]	

Qsn #	Question	Answer
203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Protia 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[Elevation range exceeds 2000 m, demonstrating environmental versatility] " <i>Syzygium cordatum</i> usually occurs in woodland and forest, nearly always near water or along watercourses, sometimes dominant in swamp forest, from sea-level up to 2400 m altitude. The average annual rainfall in the area of distribution is usually 750–1200 mm."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Protia 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Syzygium cordatum</i> is distributed from DR Congo eastward to Kenya and southward to South Africa."

205	Does the species have a history of repeated introductions outside its natural range?	n
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	No evidence of widespread cultivation outside native range

301	Naturalized beyond native range	y
	Source(s)	Notes
	Maundu, P.M. 1999. Traditional food plants of Kenya. National Museum of Kenya, Nairobi, Kenya	"In Kenya, found especially in towns. Occasionally naturalized in some areas." [Other sources regard this species as native to Kenya]
	iSpot. 2012. <i>Syzygium cordatum</i> . https://www.ispot.org.za/node/474206?nav=related . [Accessed 28 Oct 2015]	"Observed: 5th January 2012 By: Carla-Louise" ... "Sold as indigenous (to South Africa) this species in invading wetlands in the Western Cape where it is consequently not only alien, but an invasive alien."
	Gardening in South Africa. 2015. Water Berry. http://www.gardeninginsouthafrica.co.za . [Accessed 28 Oct 2015]	"Sadly, even though this species is indigenous, it is invading wetlands like Betty's Bay in the Western Cape where it is considered an invasive alien plant. This just goes to show that an indigenous plant from Kwazulu-Natal can become invasive when planted outside of its natural range."
	South African National Biodiversity Institute. 2004. PlantZAfrica - <i>Syzygium cordatum</i> . http://www.plantzafrica.com . [Accessed 27 Oct 2015]	"This is beautiful tree ... is home to many birds and insects, but invasive in the Betty's Bay area of the Western Cape."

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Thomas, V. & Grant, R. 2004. Sappi Tree Spotting: Kwazulu-Natal and Eastern Cape. Jacana Media, Johannesburg, South Africa	[Aggressive root system could cause problems] "It has an aggressive root system, and grows well in a container. It grows quickly from seed but is not frost-resistant."

Qsn #	Question	Answer
	Gardening in South Africa. 2015. Water Berry. http://www.gardeningsouthafrica.co.za . [Accessed 28 Oct 2015]	[Could cause problems if planted too close to buildings] "The water berry is a gorgeous tree for large properties and wonderful for attracting wildlife, but it needs to be planted well away from building foundations, walls, paving etc. where it can be allowed to spread, and its strong root system will not cause damage. "
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

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

304	Environmental weed	
	Source(s)	Notes
	Gardening in South Africa. 2015. Water Berry. http://www.gardeningsouthafrica.co.za . [Accessed 28 Oct 2015]	[Invading wetlands. Impacts unspecified] "Sadly, even though this species is indigenous, it is invading wetlands like Betty's Bay in the Western Cape where it is considered an invasive alien plant. This just goes to show that an indigenous plant from Kwazulu-Natal can become invasive when planted outside of its natural range."
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

305	Congeneric weed	y
	Source(s)	Notes
	Weber, E. 2003. Invasive Plant Species of the World. A Reference Guide to Environmental Weeds. CABI Publishing, Wallingford, UK	" <i>Syzygium jambos</i> : It is invasive because it forms dense impenetrable thickets that expand rapidly. The dense canopies shade out almost all native species and lead to monospecific stands. The tree resprouts vigorously after damage."

Qsn #	Question	Answer
401	Produces spines, thorns or burrs	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] "Evergreen shrub or small to medium-sized tree up to 20 m tall; bole up to 60 cm in diameter, seldom straight, often branched and gnarled, occasionally buttressed; bark surface rough, flaking or fissured, pale or dark brown; crown dense, spreading; branchlets 4-angled or slightly winged. Leaves opposite, clustered near the ends of branches, simple and entire; petiole up to 2.5(-5) mm long; blade oblong, oblong-elliptical, lanceolate-elliptical or almost round, 2.5-13.5 cm × 2-8 cm, base cordate and amplexicaul, rounded or broadly cuneate, apex rounded to acute or rarely short-acuminate or notched, blue-green above, paler green below, leathery."

402	Allelopathic	
	Source(s)	Notes
	Singh, H. P., Batish, D. R., & Kohli, R. K. (2003). Allelopathic interactions and allelochemicals: new possibilities for sustainable weed management. <i>Critical Reviews in Plant Sciences</i> , 22(3-4): 239-311	[Unknown. Other <i>Syzygium</i> species possess allelopathic chemicals] "Tworkoski (2002) tested 25 plant-derived essential oils for herbicidal activity and found that those from red thyme (<i>Thymus vulgaris</i> L.), summer savory (<i>Satureja hortensis</i> L.), cinnamon (<i>Cinnamomum zeylanicum</i> Blume), and clove (<i>Syzygium aromaticum</i> [L.] Merr. et Perry) were most toxic, causing cell death due to rapid electrolyte leakage on the detached leaves of dandelion (<i>Taraxacum officinale</i> Weber in Wiggers). Further, the application of 5 to 10% of these essential oils in combination with adjuvants caused the death of common lambsquarters, common ragweed, and johnsongrass within 1 day."

403	Parasitic	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	"Evergreen shrub or small to medium-sized tree up to 20 m tall" [No evidence. Myrtaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R. & Anthony, S. 2009 <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	"Fodder: The leaves are browsed by game (kudu, nyala, bushbuck and grey duiker), and they eat the ripe fruit."
	South African National Biodiversity Institute. 2004. <i>PlantZAfrica - Syzygium cordatum</i> . http://www.plantzafrica.com . [Accessed 27 Oct 2015]	"The foliage of this tree is eaten by Kudu and birds such as the Crowned Hornbill feed off the large hairy caterpillars that sometimes infest the tree."

405	Toxic to animals	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"The pulverized bark is sprinkled on water as fish poison."
	Orwa C., Mutua, A., Kindt R., Jamnadass, R. & Anthony, S. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	[Bark may be toxic, but no evidence for foliage or fruit] "Fodder: The leaves are browsed by game (kudu, nyala, bushbuck and grey duiker), and they eat the ripe fruit." ... "Poison: Pieces of the bark or powdered bark are used as a fish poison for catching small fish in small ponds; it turns the water bluish for up to 3 days."

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Nakabonge, G., Roux, J., Gryzenhout, M., & Wingfield, M. J. (2006). Distribution of <i>Chrysoporthe</i> canker pathogens on <i>Eucalyptus</i> and <i>Syzygium</i> spp. in eastern and southern Africa. <i>Plant Disease</i> , 90(6): 734-740	" <i>Chrysoporthe cubensis</i> and <i>C. austroafricana</i> , collectively known as <i>Cryphonectria cubensis</i> in the past, are important canker pathogens of <i>Eucalyptus</i> spp. worldwide." ... "the fungus recently has been discovered causing stem and branch cankers on native <i>Syzygium cordatum</i> Hachst. and <i>S. guineense</i> (Willd.) D.C (13)."
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"Stem and branch cankers have been observed, caused by <i>Chrysoporthe austroafricana</i> , an important pathogen of <i>Eucalyptus</i> spp. worldwide. Several <i>Botryosphaeriaceae</i> fungi cause cankers in <i>Syzygium</i> spp. as well as in <i>Eucalyptus</i> spp. Logs often split during felling, and heart rot may be present."

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	[No evidence] "Fruit edible and eaten by people, birds, monkeys and bushplgs: also made into a potent alcoholic drink."
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] "The fruit is edible, but it has a rather bland taste. It is popular with children. The fruit is also made into jellies and alcoholic drinks. It yields a purple dye, whereas an orange or reddish brown dye is obtained from the bark. The tree is a host plant of the emperor moth (<i>Micragone cana</i>), of which the edible caterpillars are collected. The flowers provide nectar for honey bees."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R. & Anthony, S. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	"The tree is believed to indicate underground water and is strongly fire resistant."

Qsn #	Question	Answer
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence. Does not occur in fire prone habitats] " <i>Syzygium cordatum</i> usually occurs in woodland and forest, nearly always near water or along watercourses, sometimes dominant in swamp forest, from sea-level up to 2400 m altitude. The average annual rainfall in the area of distribution is usually 750–1200 mm. The tree is resistant to fire."

409	Is a shade tolerant plant at some stage of its life cycle	
	Source(s)	Notes
	South African National Biodiversity Institute. 2004. PlantZAfrica - <i>Syzygium cordatum</i> . http://www.plantzafrica.com . [Accessed 27 Oct 2015]	"As its common name suggests, this is a water-loving tree, so it is best planted in full sun near a stream or river bank or any damp area."
	Gardening in South Africa. 2015. Water Berry. http://www.gardeninginsouthafrica.co.za . [Accessed 28 Oct 2015]	"Plant it in full sun in fertile soil with lots of added compost; mulch the roots regularly to conserve water."
	Grow Wild. 2015. <i>Syzygium cordatum</i> . http://growwild.co.za/trees/syzygium-cordatum . [Accessed 28 Oct 2015]	"Specifications: Semi Shade Sun" ... "It thrives when planted in wetland area and in full sun."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	n
	Source(s)	Notes
	Thomas, V. & Grant, R. 2004. Sappi Tree Spotting: Kwazulu-Natal and Eastern Cape. Jacana Media, Johannesburg, South Africa	"...a water-loving, fire-resistant tree and is found in permanently moist soil and areas of high rainfall."
	Mazza, G. 2015. <i>Syzygium cordatum</i> . http://www.photomazza.com/?Syzygium-cordatum . [Accessed 28 Oct 2015]	"It requires an exposition in full sun and draining soils with a great availability of water, especially in the warmest months."
	TreeCo. 2015. Our Trees. http://treeco.co.za/our-trees/ . [Accessed 28 Oct 2015]	"Waterbessie <i>Syzygium cordatum</i> " ... " Soil: Sandy"

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"Evergreen shrub or small to medium-sized tree up to 20 m tall"

412	Forms dense thickets	y
	Source(s)	Notes
	Morris, B. 1996. Chewa Medical Botany: A Study of Herbalism in Southern Malawi. LIT Verlag Münster, Hamburg, Germany	"Common in moister parts of the lower mountains, especially between 600-1200m, often forming almost a closed forest in swampy areas or along streams."

Qsn #	Question	Answer
	Hughes, R.H. & Hughes, J.S. 1992. A Directory of African Wetlands. IUCN, Gland, Switzerland and Cambridge, UK / UNEP, Nairobi, Kenya / WCMC, Cambridge, UK	"Mixed Freshwater Swamp Forest: A characteristic swamp forest association occurs throughout the lowlands of Mozambique" ... "In places on the coastal plain, <i>Syzygium cordatum</i> forms almost monospecific swamp groves." ... " <i>Syzygium cordatum</i> forms patches of almost pure swamp forest adjacent to some lakes in Maputaland, while elsewhere in the same district extensive patches of mixed swamp forest (described in the introduction) grow at lakeheads and along contiguous watercourses."

501	Aquatic	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[Terrestrial] " <i>Syzygium cordatum</i> usually occurs in woodland and forest, nearly always near water or along watercourses, sometimes dominant in swamp forest, from sea-level up to 2400 m altitude."

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 27 Oct 2015]	"Family: Myrtaceae subfamily: Myrtoideae tribe: Syzygieae"

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"Family Myrtaceae" [No evidence]

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"Evergreen shrub or small to medium-sized tree up to 20 m tall; bole up to 60 cm in diameter, seldom straight, often branched and gnarled, occasionally buttressed; bark surface rough, flaking or fissured, pale or dark brown; crown dense, spreading; branchlets 4-angled or slightly winged."

Qsn #	Question	Answer
601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence] " <i>Syzygium cordatum</i> has a large distribution area and there are no indications that it is threatened by genetic erosion. It is protected in South Africa."
602	Produces viable seed	y
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"Seeds can be used for propagation." ... "Germination of fresh seed is good and rapid (90% in 25 days), and pretreatment is generally not considered necessary."
603	Hybridizes naturally	y
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. 2009 Agroforestree Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	" <i>S. cordatum</i> hybridizes freely with <i>S. guineense</i> and <i>S. gerrardii</i> where they occur together."
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Syzygium cordatum</i> hybridizes with <i>Syzygium guineense</i> (Willd.) DC., and the 2 species are connected by a complete range of intermediates."

Qsn #	Question	Answer
604	Self-compatible or apomictic	
	Source(s)	Notes
	Lughadha, E. N., & Proença, C. (1996). A survey of the reproductive biology of the Myrtoideae (Myrtaceae). <i>Annals of the Missouri Botanical Garden</i> , 83(4): 480-503	"Apomixis occurs in <i>Syzygium</i> and this has been reported to be linked to the polyembryony found in this genus."
	Lack, A. J., & Kevan, P. G. (1984). On the reproductive biology of a canopy tree, <i>Syzygium syzygioides</i> (Myrtaceae), in a rain forest in Sulawesi, Indonesia. <i>Biotropica</i> , 16(1): 31-36	[A self-incompatible species] " <i>Syzygium syzygioides</i> appears to be a good example of a self-incompatible canopy tree with small flowers adapted for a wide range of generalist pollinators, a common pattern among rain forest species in all parts of the tropics"
	Chantaranothai, P., & Parnell, J. A. N. (1994). The breeding biology of some Thai <i>Syzygium</i> species. <i>Tropical Ecology</i> , 35(2): 199-208	[All species studied are self-compatible] "Pollination experiments were carried out on <i>S. samarangense</i> cv. See-nak and <i>S. jambos</i> (both cultivated species), and <i>S. megacarpum</i> and <i>S. formosum</i> (both wild species). Three breeding systems were shown to occur: apomixis, inbreeding and outbreeding. Seed set via apomixis, autogamy and geitonogamy appeared to be enhanced by the act of pollination. All species studied were self compatible and self pollination is probably common. Only a small number of daytime floral visitors were noted. These were, in order of importance, yellow-bellied sunbirds (<i>Nectarinia jugularis</i>), honey bees (<i>Apis cerana</i>), ants (<i>Oecophylla smaragdina</i> and 2 unidentified species) and a butterfly (<i>Lycaenidae</i>)."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. 2009 <i>Agroforestry Database: a tree reference and selection guide version 4.0</i> . http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	"Flowers bloom from spring to winter and are popular with bees and other insects, which are the pollinating agents."
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence of specialized pollinator requirements] "The flowers provide nectar for honey bees." ... "Flowers bisexual, regular, usually 4-merous, white, pinkish or yellowish, fragrant; pedicel 1–3 mm long; calyx 6–9 mm long, with short lobes; petals united into a cap-like covering up to 3.5 mm × 6 mm; stamens numerous, 10–15 mm long, cream or white, conspicuous, fluffy; ovary inferior, 2-celled, style (5–)10–15 mm long."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	South African National Biodiversity Institute. 2004. <i>PlantZAfrica - Syzygium cordatum</i> . http://www.plantzafrica.com . [Accessed 27 Oct 2015]	[No evidence] "The tree is best grown from seed. For better germination pre-treat seed with a pre-emergence fungicide, this will prevent seedlings from dampening off before emerging above the soil. Sow seed in a seed tray filled with well-drained soil and cover seeds with a thin layer of soil. Water well and keep in a well-ventilated area. Once seed has germinated, feed seedlings with an organic liquid fertilizer. Pot seedlings into individual plant bags or pots."

Qsn #	Question	Answer
607	Minimum generative time (years)	
	Source(s)	Notes
	Gardening in South Africa. 2015. Water Berry. http://www.gardeninginsouthafrica.co.za . [Accessed 28 Oct 2015]	"It will grow rapidly if it is grown near water or is watered regularly in the garden."
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	" <i>Syzygium cordatum</i> grows fast. In experiments in Malawi, trees were 2.7 m tall 27 months after planting. In southern Africa flowering is in August–November, and fruiting in November–March."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	[No evidence. Fruits & seeds lack means of external attachment] "Fruit an ovoid, fleshy berry, about 1.3-1.5 cm, slightly oblong, deep pink, purple or purple-black when mature, ellipsoid with a permanent calyx on top, 10-18 mm long; inside the fruit is a single, whitish seed." ... "The fruits is eaten by numerous animal species that act as the dispersal agents for the seeds."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	Orwa C., Mutua, A., Kindt R., Jamnadass, R., & Anthony, S. 2009 Agroforestry Database: a tree reference and selection guide version 4.0. http://www.worldagroforestry.org . [Accessed 27 Oct 2015]	"Ornamental: <i>S. cordatum</i> , with its evergreen glossy leaves, abundant, creamish-white flowers and blackish fruit, is an asset to any garden"

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[No evidence. Unlikely. A large tree with relatively large seeds] "Evergreen shrub or small to medium-sized tree up to 20 m tall" ... "Fruit an oblong to nearly globose or urn-shaped berry 1–2 cm × (0.5–)1 cm, purple when ripe, tipped by the persistent calyx, usually 1-seeded."

704	Propagules adapted to wind dispersal	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). Prota 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[No adaptations for wind dispersal] "Fruit an oblong to nearly globose or urn-shaped berry 1–2 cm × (0.5–)1 cm, purple when ripe, tipped by the persistent calyx, usually 1-seeded."

705	Propagules water dispersed	
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Qsn #	Question	Answer
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). ProtA 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[Distribution near water suggests water dispersal is possible] "Syzygium cordatum usually occurs in woodland and forest, nearly always near water or along watercourses, sometimes dominant in swamp forest, from sea-level up to 2400 m altitude."

706	Propagules bird dispersed	y
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). ProtA 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	"Fruit an oblong to nearly globose or urn-shaped berry 1–2 cm × (0.5–)1 cm, purple when ripe, tipped by the persistent calyx, usually 1-seeded."
	Wilson, A. L., & Downs, C. T. (2012). Food intake rates, assimilation efficiency, and transit times of Knysna (<i>Tauraco corythaix</i>) Turacos fed South African indigenous fruit. <i>Journal of Ornithology</i> , 153(2): 285-290	"Knysna Turacos ingested significantly different amounts of the respective fruit species in terms of wet weight (F5,25 = 12.41, P \0.001; Table 2). They ingested the greatest amount of <i>Syzygium cordatum</i> (0.70 ± 0.05 g g-1 BM, n = 6)" ... "Knysna Turacos were observed to have the highest intake rates in terms of wet weight on the <i>S. cordatum</i> diet where they had the highest gross energy intake and highest apparent energy assimilation ..."
	Wilson, A. L., & Downs, C. T. (2012). Knysna Turacos (<i>Tauraco corythaix</i>) do not improve seed germination of ingested fruit of some indigenous South African tree species. <i>South African Journal of Botany</i> , 78: 55-62	"Seed dispersal plays an important role in the persistence, regeneration and maintenance of plant communities. It is therefore not surprising that much attention has been paid to the germination potential of seeds ingested by frugivorous animals. Consequently the aim of this study was to determine what effect ingestion of seeds by Knysna Turacos (<i>Tauraco corythaix</i>) has on the germination rate and germination percentage of indigenous South African tree species." ... "Mean regurgitated seed percentage germination ranged from 4.6±2.5 (R. prinoides) to 94.2±5.8% (<i>Syzygium cordatum</i>), which was not significantly different to ingested, pulp removed and whole fruit seeds"
	Geldenhuys, C. J. (1997). Native forest regeneration in pine and eucalypt plantations in Northern Province, South Africa. <i>Forest Ecology and Management</i> , 99(1): 101-115	"Table 6 Frequency of occurrence and propagule types of tree species recorded from the understorey regeneration in pine, eucalypt and acacia plantation stands on the forest margin in Northern Province, South Africa" ... "Fleshy' propagules dispersed by animals" [Includes <i>Syzygium cordatum</i>]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). ProtA 7(1): Timbers/Bois d'œuvre 1. [CD-Rom]. PROTA, Wageningen, Netherlands	[Adapted for internal dispersal] "Fruit an oblong to nearly globose or urn-shaped berry 1–2 cm × (0.5–)1 cm, purple when ripe, tipped by the persistent calyx, usually 1-seeded."

708	Propagules survive passage through the gut	y
	Source(s)	Notes

Qsn #	Question	Answer
	Mng'omba, S. A., du Toit, E. S., & Akinnifesi, F. K. (2007). Germination characteristics of tree Seeds: spotlight on Southern African tree species. <i>Tree and Forestry Science and Biotechnology</i> , 1(1): 81-88	"According to Nichols (2005), <i>S. birrea</i> (marula) and <i>Syzygium cordatum</i> seeds are subjected to digestive juice in the guts of wild animals. This process is said to remove any seed germination inhibitors, and hence enables the seeds to germinate."
	Webala, P. W., Musila, S., Makau, R. (2012). Population Ecology, Diet and Movement of Straw-coloured Fruit Bats (<i>Eidolon helvum</i>), Western Kenya. With support from Rufford Small Grants Foundation	"Germination experiments also revealed local fruits used by humans such as <i>Carica papaya</i> (Family Caricaceae), <i>Eriobotrya japonica</i> (Family Rosaceae), and <i>Syzygium cordatum</i> and <i>S. guineense</i> (Family Myrtaceae) in the diet of <i>E. helvum</i> ." ... "Table 3. Plant species whose fruits are fed on by <i>E. helvum</i> in western Kenya as identified from the bats' faecal material and through direct observations" [<i>Syzygium cordatum</i> seeds germinated from droppings]
	Schmidt, E., Lötter, M. & McClelland, W. 2002. Trees and shrubs of Mpumalanga and Kruger National Park. Jacana Media, Johannesburg, South Africa	[Presumably yes] "Fruit edible and eaten by people, birds, monkeys and bushplgs"

801	Prolific seed production (>1000/m ²)	n
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	"Fruit an oblong to nearly globose or urn-shaped berry 1–2 cm × (0.5–)1 cm, purple when ripe, tipped by the persistent calyx, usually 1-seeded." [Fruits and seeds relatively large, and fruits often few or no seeded]

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
	Source(s)	Notes
	Maundu, P.M. 1999. Traditional food plants of Kenya. National Museum of Kenya, Nairobi, Kenya	"Easily grown from seeds. Seeds do not store."
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	[One day viability] "Seeds can be used for propagation. The 1000-seed weight is 2–2.5 kg. Seeds are recorded to retain viability for a day only, and should not be dried in the sun."

803	Well controlled by herbicides	
	Source(s)	Notes
	Motooka, P., Castro, L., Nelson, D., Nagai, G. & Ching, L. 2003. Weeds of Hawaii's Pastures and Natural Areas: An Identification and Management Guide. CTAHR, UH Manoa, Honolulu, HI	"Sensitive to picloram applied cut surface and to glyphosate applied to drilled holes. Good control with triclopyr applied basal bark and cut-surface(30)." [Herbicides effective on related invasive species <i>S. jambos</i> , so may also be effective on <i>S. cordatum</i>]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Brink, M., 2008. <i>Syzygium cordatum</i> Hochst. ex C.Krauss. In: Louppe, D., Oteng-Amoako, A.A. & Brink, M. (Editors). <i>Prota 7(1): Timbers/Bois d'œuvre 1</i> . [CD-Rom]. PROTA, Wageningen, Netherlands	"The tree is resistant to fire." ... "Pollarding is possible."

Qsn #	Question	Answer
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	<p style="text-align: center;">Source(s)</p> <p>Roux, J., Germishuizen, I., Nadel, R., Lee, D. J., Wingfield, M. J., & Pegg, G. S. (2015). Risk assessment for <i>Puccinia psidii</i> becoming established in South Africa. <i>Plant Pathology</i>. doi: 10.1111/ppa.12380</p>	<p style="text-align: center;">Notes</p> <p>[Susceptibility of <i>S. cordatum</i> unknown] "<i>Puccinia psidii</i>, the causal agent of myrtle rust, was first recorded from Latin America more than 100 years ago. It occurs on many native species of Myrtaceae in Latin America and also infects non-native plantation-grown <i>Eucalyptus</i> species in the region. The pathogen has gradually spread to new areas including Australia and most recently South Africa. The aim of this study was to consider the susceptibility of selected <i>Eucalyptus</i> genotypes, particularly those of interest to South African forestry, to infection by <i>P. psidii</i>. In addition, risk maps were compiled based on suitable climatic conditions and the occurrence of potential susceptible tree species. This made it possible to identify the season when <i>P. psidii</i> would be most likely to infect and to define the geographic areas where the rust disease would be most likely to establish in South Africa. As expected, variation in susceptibility was observed between eucalypt genotypes tested. Importantly, species commonly planted in South Africa show good potential for yielding disease-tolerant material for future planting. Myrtle rust is predicted to be more common in spring and summer. Coastal areas, as well as areas in South Africa with subtropical climates, are more conducive to outbreaks of the pathogen."</p>

Summary of Risk Traits:

High Risk / Undesirable Traits

- Within native range, elevation range exceeds 2000 m, demonstrating potential environmental versatility
- Thrives in tropical climates
- Naturalized in South Africa, outside native range
- Aggressive root system
- Other *Syzygium* species have become invasive
- Potential alternate host of Eucalyptus pathogens
- Forms pure stands in native range
- Reproduces by seeds
- Hybridizes with other *Syzygium* species
- Rapid growth rate (time to reproductive maturity unknown)
- Seeds dispersed by birds, mammals, intentionally by people & possibly by water
- Resistance to fire, & tolerant of pollarding

Low Risk Traits

- No reports of detrimental impacts, but no evidence of widespread introduction outside native range
- Unarmed (no spines, thorns or burrs)
- Provides fodder for livestock & other animals
- Ornamental & medicinal uses, & edible fruit
- Requires constantly moist soil
- Not reported to spread vegetatively
- One-seeded fruit (limits reproductive output)
- Seeds lose viability rapidly

Second Screening Results for Tree/tree-like shrubs

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

(B) Bird-dispersed?> Dispersed by birds

(C) Life cycle < 4 years? Unknown

Outcome = Evaluate Further

