

Key Words: Low Risk, Tropical, Ornamental Palm, Betel Nut Substitute, Fleshy-fruit

**Family:** *Arecaceae*

**Taxon:** *Areca vestiaria*

**Synonym:** *Areca henrici* Furtado

*Areca langloisiana* Potztl

*Areca leptopetala* Burret

*Areca paniculata* (Miq.) Scheff.

**Common Name:** orange crownshaft palm

pinang merah

red pinang

**Questionnaire :** current 20090513  
**Status:** Assessor Approved

**Assessor:** Chuck Chimera  
**Data Entry Person:** Chuck Chimera

**Designation:** L

**WRA Score** -2

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)	High
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
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)	n
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	
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals	y=1, n=-1	
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens	y=1, n=0	n
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	y

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	
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	
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	>3
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	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	n
708	Propagules survive passage through the gut	y=1, n=-1	y
801	Prolific seed production (>1000/m2)	y=1, n=-1	
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	
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	y=-1, n=1	
<b>Designation: L</b>		<b>WRA Score -2</b>	

## Supporting Data:

101	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Is the species highly domesticated? No evidence] "The wide morphological variation noticed in the palm which ranges from the profusely stilt rooted condition to having no aerial root at all, densely clustering to single-stemmed habit, colour of leaf-sheath ranging from red, bright orange, light orange and brown, and the variation in the colour of fruits which changes as the fruit matures, all contributed to the confusion of its name. Further, the bright orange colour of crownshaft, spathe and mature fruits become less attractive at lower altitudes. Thus, the palm appeared differently for palmists who saw them in small numbers at only a single location."
102	2012. WRA Specialist. Personal Communication.	NA
103	2012. WRA Specialist. Personal Communication.	NA
201	2001. Ellison, D./Ellison, A.. Cultivated palms of the world. UNSW Press, Sydney.	[Species suited to tropical or subtropical climate(s) 2-High]"It can be established in subtropical to tropical areas with adequate protection, plenty of water and partial shade."
201	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Species suited to tropical or subtropical climate(s) 2-High] "This species is relatively widely distributed in East Malesia, occurring throughout Sulawesi, north and central Maluku, except for Ambon, Kei, Aru and Tanimbar"
201	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Species suited to tropical or subtropical climate(s) 2-High] " <i>Areca vestiaria</i> , a clustering, shade-loving ornamental palm is native to North Sulawesi, the northernmost province of Sulawesi Island (formerly known as Celebes)."
202	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Quality of climate match data 2-High]
203	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Broad climate suitability (environmental versatility)? Yes] " <i>Areca vestiaria</i> grows on volcanic soils from lowlands to highlands up to about 2000 m above sea level. Two collections (Mogea 1303, 1305) have been made on the summit of Mt. Maleno in Central Sulawesi, at an altitude of 2260 m above sea level, from a population with the tallest recorded individuals (to 30 m high), and these are quite exceptional for <i>A. vestiaria</i> ." [Elevation range exceeds 1000 m in tropics]
203	2012. Palmpedia. <i>Areca vestiaria</i> . <a href="http://www.palmpedia.net/wiki/Areca_vestiaria">http://www.palmpedia.net/wiki/Areca_vestiaria</a> [Accessed 19 Dec 2012]	[Broad climate suitability (environmental versatility)? Yes. Possesses environmental versatility] " <i>Areca vestiaria</i> grows naturally in low mountainous terrain up to an elevation of 1200 meters in the rain forests of eastern Indonesia, Maluku, Sulawesi." [Elevation range exceeds 1000 m in tropics] ... "Although tropical in nature, this palm appears able to withstand periodic low temperatures, but will eventually succumb to persistent coolness, often times only surviving until January in the So. California winter. It could probably survive close to nighttime freezing, if the days remained on the warm side, as is often the case in parts of Florida."
204	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Native or naturalized in regions with tropical or subtropical climates? Yes] " <i>Areca vestiaria</i> , a clustering, shade-loving ornamental palm is native to North Sulawesi, the northernmost province of Sulawesi Island (formerly known as Celebes). This palm also grows in the neighbouring Maluku Province especially in the northern islands`"
205	2005. Staples, G.W./Herbst, D.R.. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	[Does the species have a history of repeated introductions outside its natural range? Uncommon in Hawaii]
205	2007. Randall, R.P.. The introduced flora of Australia and its weed status. CRC for Australian Weed Management, Glen Osmond, Australia	[Does the species have a history of repeated introductions outside its natural range? Australia]
205	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	[Does the species have a history of repeated introductions outside its natural range? Singapore]

205	2012. Dave's Gardern. PlantFiles: Orange Crownshaft Palm, Pinang Merah <i>Areca vestiaria</i> . <a href="http://davesgarden.com/guides/pf/go/60060/">http://davesgarden.com/guides/pf/go/60060/</a> [Accessed 19 Dec 2012]	[Does the species have a history of repeated introductions outside its natural range?] "This plant has been said to grow in the following regions: Huntington Beach, California Oceanside, California Cape Coral, Florida Fountainbleau, Florida Melrose Park, Florida Naples, Florida Port Charlotte, Florida Winter Park, Florida Ainaloa, Hawaii"
301	2007. Randall, R.P.. The introduced flora of Australia and its weed status. CRC for Australian Weed Management, Glen Osmond, Australia	[Naturalized beyond native range? Not in Australia]
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] " <i>Areca vestiaria</i> Giseke; tree; exotic; cultivated only"
301	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Naturalized beyond native range? No evidence]
302	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Garden/amenity/disturbance weed? No evidence]
303	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Agricultural/forestry/horticultural weed? No evidence]
304	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Environmental weed? No evidence]
305	2012. Randall, R.P.. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	[Congeneric weed? No] <i>Areca catechu</i> and <i>A. triandra</i> listed as naturalized, and/or weedy, but no evidence of detrimental impacts is unspecified or lacking
401	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Produces spines, thorns or burrs? No evidence] "Description: Solitary or clustering, moderate palm, to 10(-15) m tall, with stilt roots. STEM 7-10 cm in diameter; internodes 10-20 cm long, greenish yellow with conspicuous leaf scars. LEAVES about 11 in crown, 200-350 cm long (including petiole); sheath tubular, 60-70 x 20-30 cm; crownshaft 120-165 cm long and 20-30 cm in diameter, orange, reddish to bright red (rarely pale green) with numerous punctiform brown scales; petiole 4.5-45.0 cm long, 2-4 cm wide and 1-2 mm thick at the base, channelled adaxially, rounded abaxially, yellowish-green to orange (rarely pale green); leaflets somewhat irregularly arranged, papery to leathery, 11-16 leaflets on each side of the rachis, the basal-most leaflets 54-71 x 1.0- 4.5 cm, two- to three-fold, lanceolate to sigmoid with oblique tips, the middle leaflets 95-117 x 7-16 cm, three- to four-fold, slightly sigmoid with oblique, notched tips, terminal leaflets 30-55 x 2-13 cm, flabellate, 4-11-fold, notched at tips with splits 5-11 cm deep between the folds, green, slightly discoloured when dried, with fine sparse ramenta on mid vein in abaxial surface."
402	2012. WRA Specialist. Personal Communication.	[Allelopathic? Unknown]
403	2010. The Plant List. Version 1. <a href="http://www.theplantlist.org/">http://www.theplantlist.org/</a>	[Parasitic? No] <i>Arecaceae</i>
404	2007. Riley, E. P.. Flexibility in Diet and Activity Patterns of <i>Macaca tonkeana</i> in Response to Anthropogenic Habitat Alteration. International Journal of Primatology. 28: 107-133.	[Unpalatable to grazing animals? Unknown. Shoots/leaves browsed by macaques] "Table V. Plant food species included in the diet of <i>Macaca tonkeana</i> (with local name of the species, specific group observed consuming the species, and plant part consumed)" [ <i>Areca vestiaria</i> ; FR = fruits and SS = shoots and sprouts consumed]
405	2007. Riley, E. P.. Flexibility in Diet and Activity Patterns of <i>Macaca tonkeana</i> in Response to Anthropogenic Habitat Alteration. International Journal of Primatology. 28: 107-133.	[Toxic to animals? No evidence] Macaques feed on fruits, shoots and young leaves
405	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Toxic to animals? No evidence]
406	2001. Ellison, D./Ellison, A.. Cultivated palms of the world. UNSW Press, Sydney.	[Host for recognized pests and pathogens? No evidence]
406	2003. Riffle, R.L./Craft, P.. An Encyclopedia of Cultivated Palms. Timber Press, Portland, OR.	[Host for recognized pests and pathogens? No evidence]

407	2008. Wagstaff, D.J.. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	[Causes allergies or is otherwise toxic to humans? No evidence]
407	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms (Arecaceae) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Causes allergies or is otherwise toxic to humans? No evidence] "The fruits are used as a betel nut substitute, tonic and male contraceptive in North Sulawesi. This species is a popular ornamental."
408	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms (Arecaceae) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Creates a fire hazard in natural ecosystems? No evidence]
408	2012. Palmpedia. <i>Areca vestiaria</i> . <a href="http://www.palmpedia.net/wiki/Areca_vestiaria">http://www.palmpedia.net/wiki/Areca_vestiaria</a> [Accessed 19 Dec 2012]	[Creates a fire hazard in natural ecosystems? No evidence. Rain forest habitat] " <i>Areca vestiaria</i> grows naturally in low mountainous terrain up to an elevation of 1200 meters in the rain forests of eastern Indonesia, Maluku, Sulawesi."
409	2006. Wong, M.. Palms for Hawaii Landscapes. Landscape. L-19: .College of Tropical Agriculture and Human Resources, Honolulu, HI	[Is a shade tolerant plant at some stage of its life cycle? Yes] "Another palm with exceptional color (orange) is <i>Areca vestiaria</i> (Fig. 2). This clumping palm will do best with some shade."
409	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Is a shade tolerant plant at some stage of its life cycle? Yes] " <i>Areca vestiaria</i> , a clustering, shade-loving ornamental palm is native to North Sulawesi, the northernmost province of Sulawesi Island..."
409	2012. Palmpedia. <i>Areca vestiaria</i> . <a href="http://www.palmpedia.net/wiki/Areca_vestiaria">http://www.palmpedia.net/wiki/Areca_vestiaria</a> [Accessed 19 Dec 2012]	[Is a shade tolerant plant at some stage of its life cycle? Yes] "They prefer a sheltered, consistently moist and humid location, with more shade in less humid environments."
410	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms (Arecaceae) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] " <i>Areca vestiaria</i> grows on volcanic soils from lowlands to highlands up to about 2000 m above sea level."
410	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] " <i>Areca vestiaria</i> is not a swamp-loving palm. On the contrary, it lives on well drained volcanic soils." ... "The species prefers damp soil of pH 6.5 to 6.8,"
410	2012. Palmpedia. <i>Areca vestiaria</i> . <a href="http://www.palmpedia.net/wiki/Areca_vestiaria">http://www.palmpedia.net/wiki/Areca_vestiaria</a> [Accessed 19 Dec 2012]	[Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)?] "A rich well draining soil would appear to be the best."
411	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms (Arecaceae) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Climbing or smothering growth habit? No] "All species in East Malesia are solitary, except for <i>A. vestiaria</i> (although some populations of <i>A. vestiaria</i> are single-stemmed)."
412	2012. Palmpedia. <i>Areca vestiaria</i> . <a href="http://www.palmpedia.net/wiki/Areca_vestiaria">http://www.palmpedia.net/wiki/Areca_vestiaria</a> [Accessed 19 Dec 2012]	[Forms dense thickets? Unknown] "Clumping individuals will attain widths up to 15 ft/4.5m and heights of 20-25 ft/6-8m. This palm will often times exhibit distinct aerial or stilt roots emerging from the 3-4in/7-10cm. diameter trunks."
501	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms (Arecaceae) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Aquatic? No] " <i>Areca vestiaria</i> grows on volcanic soils from lowlands to highlands up to about 2000 m above sea level."
502	2010. The Plant List. Version 1. <a href="http://www.theplantlist.org/">http://www.theplantlist.org/</a>	[Grass? No] Arecaceae
503	2010. The Plant List. Version 1. <a href="http://www.theplantlist.org/">http://www.theplantlist.org/</a>	[Nitrogen fixing woody plant? No] Arecaceae
504	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms (Arecaceae) of East Malesia. Botanical Journal of the Linnean Society. 168: 147-173.	[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Moderate to large palm with stem to 10(-15) m tall and 7-15 cm in diameter; solitary or clustering; crownshaft brilliant orange, reddish to bright red (rarely pale green); inflorescence always branched to two orders; staminate flowers glabrous, stamens not epipetalous, anthers sagittate and elongate; Sulawesi to Maluku"

601	2008. Ramadhani/Tjitrosoedirdjo, S.S./Setiadi, D.. Structure and composition of understory plant assemblages of six land use types in the Lore Lindu National Park, Central Sulawesi, Indonesia. <i>Bangladesh Journal of Plant Taxonomy</i> . 15(1): 1-12.	[Evidence of substantial reproductive failure in native habitat? No evidence] "In the present study the diversity and species composition of understory plants are examined in the submontane forest of Lore Lindu National Park, Central Sulawesi, Indonesia by comparing three rain forest types and three types of plantations of cacao differing in use intensity." ... "The species composition of understory plants was different among land use types. In the undisturbed forest (type A), dominating tree seedling species were <i>Acer laurinum</i> Hassk. (Aceraceae), <i>Areca vestiaria</i> Giseke (Arecaceae),..." ... "In the lightly disturbed rain forest (type B), dominant tree seedling recorded were <i>Areca vestiaria</i> , <i>Arenga pinnata</i> (Wurmb) Merr..."
601	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : Arecaceae) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Evidence of substantial reproductive failure in native habitat? No] "Conservation status: Least Concern (LC). This species is widespread and also well established in ornamental horticulture as highlighted by Ellison & Ellison (2001)."
602	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Produces viable seed? Yes] "This ornamental palm can be propagated either through fruits or suckers."
603	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : Arecaceae) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Hybridizes naturally? Unknown] No evidence
604	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Self-compatible or apomictic? Unknown, but differential timing of male and female flower development may prevent self-fertilization] "Unlike in the common <i>Areca catechu</i> where the female flowers, 1-3, are placed at the base of each spike, in 'pinang merah' the female flowers are distributed practically throughout the length of the spike, intermingled with male flowers Blooming phase of male flowers commences from the time they emerge from the spathe, and the male flowers continue to bloom and shed for about 15 days, only after which, the female flowers attain receptivity. This alternation of male and female blooming phases favours cross pollination to take place."
605	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : Arecaceae) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Requires specialist pollinators? Floral morphology suggests no] "FLORAL CLUSTERS spirally arranged on rachillae, complete triads including pistillate flowers occurring to half of the length of all rachillae. STAMINATE FLOWERS 7.00– 9.75 $\pm$ 3.00 mm at anthesis, triangular, asymmetrical, elongate, cream to yellowish-white; calyx cupular, low, 2 mm wide and 1.5–2.5 mm high, with shallow marginal lobes; petals three, thick and fleshy, 6.5– 9.0 $\pm$ 3.0 mm, elongate, ovate; stamens six, white to yellowish-cream, 6–7 $\pm$ 1 mm; filaments shorter than anthers, 2–3 $\pm$ 0.3–0.5 mm, white and becoming dark brown after anthesis; anthers 5.0–5.8 mm long, arrow-head shaped; pistillode low, various shapes. PISTILLATE FLOWERS 7–9 $\pm$ 6.0–6.5 mm, triangular, asymmetrical; sepals three, 6–8 $\pm$ 4.0–6.5 mm, triangular, strongly imbricate; petals three, similar to sepals, triangular, strongly imbricate; gynoecium 5.5 $\pm$ 0.75–1.50 mm (including stigma), cylindrical; staminodes four to six, triangular (wedge shaped), low, membranous."
606	2003. Riffle, R.L./Craft, P.. <i>An Encyclopedia of Cultivated Palms</i> . Timber Press, Portland, OR.	[Reproduction by vegetative fragmentation? Possibly No] "Propagation by division of the suckers is usually unsuccessful."
606	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Reproduction by vegetative fragmentation? Possibly. Conflicting information] "This ornamental palm can be propagated either through fruits or suckers."
607	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Minimum generative time (years)? >4] "Although fairly slow growing, <i>Areca vestiaria</i> is easy to grow and the 11 year old specimen in Figure 2 has survived temperature as low as 5°C and has been seeding for the last five years." [Reproductive at 6 years of age]
701	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : Arecaceae) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? No] "FRUITS 2.0–3.0 $\times$ 1.0–1.5 $\times$ 1.0– 1.5 cm, obovate to ellipsoid, yellowish orange to red when ripe, costate when dried; epicarp thin and smooth; mesocarp fleshy and juicy; endocarp thin and fibrous. SEEDS 1.3–1.5 $\times$ 1.1–1.2 $\times$ 1.1–1.2 cm, ovoid, rounded apically and flattened basally." [Unlikely. Fruits/seeds relatively large and lack means of external attachment]
702	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Propagules dispersed intentionally by people? Yes] "By whatever name <i>Areca vestiaria</i> was known until recently, this wild palm is one of the most beautiful ornamental pinnate palms, comparable only to the sealing-wax palm in beauty."

703	2012. WRA Specialist. Personal Communication.	[Propagules likely to disperse as a produce contaminant? No evidence] Unlikely, as fruits and seeds are relatively large.
704	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Propagules adapted to wind dispersal? No] "The fruit develops into a one seeded berry whose epicarp and perianth are bright red which enhances the value of this wild palm as an ornamental."
705	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Propagules water dispersed? No evidence] " <i>Areca vestiaria</i> grows on volcanic soils from lowlands to highlands up to about 2000 m above sea level." [Fleshy-fruited, and not associated with riparian areas]
706	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Propagules bird dispersed? Potentially Yes] "FRUITS 2.0–3.0 × 1.0–1.5 × 1.0–1.5 cm, obovate to ellipsoid,..." [Fleshy-fruited. May be dispersed by game birds or larger frugivorous species]
707	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Propagules dispersed by other animals (externally)? No evidence] "FRUITS 2.0–3.0 × 1.0–1.5 × 1.0–1.5 cm, obovate to ellipsoid, yellowish orange to red when ripe, costate when dried; epicarp thin and smooth; mesocarp fleshy and juicy; endocarp thin and fibrous. SEEDS 1.3–1.5 × 1.1–1.2 × 1.1–1.2 cm, ovoid, rounded apically and flattened basally." [Fleshy-fruited and lacking means of external attachment. Rodents or other frugivorous mammals may carry fruit and/or seeds externally for caching or consumption]
708	2004. Gerold, G./Fremerey, M./Guhardja, E. (eds.). <i>Land Use, Nature Conservation and the Stability of Rainforest Margins in Southeast Asia</i> . Springer-Verlag, Berlin Heidelberg	[Propagules survive passage through the gut? Presumably Yes] "Table 2. List of plant species and plant parts consumed by <i>Macaca tonkeana</i> at Lore Lindu National Park, Central Sulawesi" [ <i>Areca vestiaria</i> fruits consumed by Tonkean macaques]
708	2007. Riley, E. P.. <i>Flexibility in Diet and Activity Patterns of Macaca tonkeana in Response to Anthropogenic Habitat Alteration</i> . <i>International Journal of Primatology</i> . 28: 107-133.	[Propagules survive passage through the gut? Presumably Yes] "Table V. Plant food species included in the diet of <i>Macaca tonkeana</i> (with local name of the species, specific group observed consuming the species, and plant part consumed)" [ <i>Areca vestiaria</i> ; FR = fruits and SS = shoots and sprouts consumed]
708	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Propagules survive passage through the gut? Presumably Yes. Fleshy-fruited] "Although 'pinang merah' (red pinang) is a more common name, it is also known as 'pinang yaki' (monkey pinang). Perhaps monkeys, especially the Sulawesi crested macaque, enjoys the ripe fruits of pinang merah because of its sweet mesocarp and this could have earned its popular name." [Feral pigs might consume fallen fruits and disperse seeds]
801	2012. Heatubun, C.D./Dransfield, J./Flynn, T./Tjitrosoedirdjo, S.S./Mogea, J.P./Baker, W J.. A monograph of the betel nut palms ( <i>Areca</i> : <i>Arecaceae</i> ) of East Malesia. <i>Botanical Journal of the Linnean Society</i> . 168: 147-173.	[Prolific seed production (>1000/m <sup>2</sup> )? Unknown, but unlikely] "FRUITS 2.0–3.0 × 1.0–1.5 × 1.0–1.5 cm, obovate to ellipsoid, yellowish orange to red when ripe, costate when dried; epicarp thin and smooth; mesocarp fleshy and juicy; endocarp thin and fibrous. SEEDS 1.3–1.5 × 1.1–1.2 × 1.1–1.2 cm, ovoid, rounded apically and flattened basally." [Fruits and seeds relatively large]
802	2008. Royal Botanic Gardens Kew. Seed Information Database (SID). Version 7.1. <a href="http://data.kew.org/sid/">http://data.kew.org/sid/</a>	[Evidence that a persistent propagule bank is formed (>1 yr)? Related species recalcitrant] <i>Areca catechu</i> - Storage Behaviour: Recalcitrant
802	2012. PACSOA. Palms: <i>Areca vestiaria</i> . PACSOA (Palm and Cycad Society of Australia), <a href="http://www.pacsoa.org.au/palms/Areca/vestiaria.html">http://www.pacsoa.org.au/palms/Areca/vestiaria.html</a> [Accessed 18 Dec 2012]	[Evidence that a persistent propagule bank is formed (>1 yr)? Presumably No] "The viability of fruit is short."
803	2012. WRA Specialist. Personal Communication.	[Well controlled by herbicides? Unknown] No information on herbicide efficacy or chemical control of this species
804	2012. WRA Specialist. Personal Communication.	[Tolerates, or benefits from, mutilation, cultivation, or fire? Unknown]
805	2012. WRA Specialist. Personal Communication.	[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown]

## **Summary of Risk Traits**

### **High Risk / Undesirable Traits**

- Thrives in tropical climates
- Broad elevation range (> 1000 m)
- Shade-tolerant
- Fleshy-fruit consumed and seeds dispersed by frugivorous mammals and birds
- Intentionally planted by people

### **Low Risk / Desirable Traits**

- No evidence of naturalization or invasiveness
- Unarmed
- Non-toxic
- Fruit with medicinal properties
- Landscaping and ornamental value
- Relatively large fruit & seeds are unlikely to be inadvertently dispersed