

Madagascar Plant Conservation Management Plan

Tahina spectabilis



Taxonomy: Kingdom: Plantae; Phylum: Tracheophyta; Class: Liliopsida; Order: Arecales; Family: Areaceae; Subfamily: Coryphoideae; Tribe: Chuniophoeniceae; Genus: *Tahina*; Species: *Tahina spectabilis* J.Dransf. & Rakotoarinivo

Description: *Tahina spectabilis* is a huge palm up to 18m tall, with enormous leaves up to 5m across. The species flowers once, at the end of its life, producing an enormous inflorescence 4-5m high, covered in millions of small flower.

IUCN Red List status: Critically Endangered (2012)

Threats: Habitat destruction and disturbance for agriculture and charcoal production; grassland fires; trampling of seedlings by cattle; over-collection of seed for horticulture; harvesting heart for food and leaves for ceremonial purposes.

Actions: Protection of sites from deforestation and land use change; firebreaks; fencing to prevent trampling by zebu; local monitoring of populations for flowering, growth, survival rates, and presence of potentially harmful pests; appropriate seed collection, seed sales, and ecotourism to provide funding for local communities; collection of seed to increase genetic diversity of *ex situ* collections; creation of an *ex situ* living population.

Distribution and population	
Global	
Endemic to Madagascar	
Local	
<i>Tahina spectabilis</i> is restricted to a very small area in northwest Madagascar, on a remote peninsula in the Analalava district near the village of Antanamarina, and at second (only very recently discovered) site near to the Route National 6 near the village of Amparahibe.	
Population	
The population near Antanamarina comprises: one main population at Antsingilava (27 adults, 87 juveniles, 395 seedlings); a seedling population at Ambatosaromby (170 in total); one stunted adult individual in exposed grassland near village of Antsanifera; and one large trunked individual south of Antsingilava (total population 681 individuals). At the Amparahibe site there is one main population (3 adults, 15 juveniles, 5 seedlings) plus two isolated stunted adult individuals nearby (total population 25 individuals). The total known population of <i>Tahina spectabilis</i> in the wild is 34 adults, 102 juveniles, 570 seedlings – 706 known plants.	



Status							
Population estimate	34 trunked adults (706 plants including seedlings)	Trend	Currently stable	IUCN status	Critically Endangered B1ab(iii); D (ver 3.1)	Date last assessed	2012

Citation: Gardiner, L.M., Rabehevitra, D. and Rajaonilaza, T. (2017). *Tahina spectabilis* species conservation management plan. Royal Botanic Gardens, Kew. Published online, DOI: 10.13140/RG.2.2.21757.77280.

Ecology and genetics	
Habitat	
Near Antanamarina, most of the individuals are growing around a limestone karst (<i>tsingy</i>) outcrop (Antsingilava), with a few individuals and seedlings found nearby in more open grassland. At Amparahibe, the main population is found in a fragment of forest near a small river, with a few individuals growing nearby in more open land. At both sites, the individuals in the <i>tsingy</i> and the forest fragment are protected by the surrounding habitat and the presence of nearby tombs which have religious and cultural significance, affording some protection to the plants from harvesting and deforestation.	
Reproduction and life history	
<i>Tahina</i> is a hapaxanthic species, flowering only once, at the end of its life. When it does flower, it can produce many thousands of seeds. Flowering events are infrequent and currently the triggers (possibly including El Nino events or other climatic factors) are not understood, and so predicting when flowering will occur again is currently not possible.	
Taxonomy and genetics	
<i>Tahina</i> is phylogenetically significant, being a monotypic species (ie. there is only one species in the world in the genus) genetically distant from all other palms in Madagascar, and its closest relatives are found in Asia. Population genetic analysis (James, 2010) of individuals at the Antanamarina site revealed very low levels of genetic diversity, but suggested that possibly additional populations of the species might still be undiscovered elsewhere on the peninsula. The recently discovered site near Amparahibe has confirmed that at least one other population exists, and in this case at a much greater distance from the original site than previously predicted, but the remaining vegetation in this area is fragmented and subject to extreme human pressure.	

Threats		
Deforestation and land use conversion	Impact	HIGH
<p>Removing the habitat in which <i>Tahina</i> grows through deforestation, charcoal production, and land use conversion, eg. for slash and burn agriculture (<i>tavy</i>) or to create rice fields, will reduce the number of <i>Tahina</i> individuals growing in the wild. At Antanamarina the main population is found in the <i>tsingy</i> outcrop, relatively protected by virtue of the <i>tsingy</i> being unsuitable for agriculture. The <i>tsingy</i> is also protected to a degree by local people as it contains tombs of ancestors, and it is forbidden (<i>fady</i>) to damage the plants there. The seedling population at Ambatosaromby is vulnerable to the conversion of the open grassland to rice fields. At Amparahibe, the two isolated individuals are vulnerable, being on hillsides subject to deforestation. Deforestation and habitat loss at both sites could ultimately lead to the loss of seed dispersers for <i>Tahina</i> – thought to be bats and lemurs (long distance), and parrots (short distances), and even potentially the loss of pollinating insects.</p> <p>Mitigation: The loss of habitat at both sites should be prevented through the raising of awareness of the importance and significance of <i>Tahina</i>, its connection with the sites of tombs of the ancestors, the potential income which has and can continue to be generated through sustainable seed collection and sales, and appropriate ecotourism to see <i>Tahina</i> in the wild.</p>		
Fire in surrounding landscape	Impact	MEDIUM
<p>Fire causes seedling mortality, the weakening and eventual death of juvenile and adult individuals, and the stunted growth of individuals. At both the Antanamarina <i>tsingy</i> site and Amparahibe forest sites, deforestation and initial burning is not thought to be a major threat to the populations. The limestone rock-faces of the <i>tsingy</i> affords the plants some physical protection from burning, and the <i>tsingy</i> is surrounded by a well-maintained 6m wide firebreak to separate it from surrounding grassland. At Amparahibe the main population is in a fragment of forest, near to a small river, and the vegetation and humidity of the site is unlikely to be vulnerable to burning. The isolated individuals near both main sites are vulnerable to grassland burning and the plants at both show clear signs of stunted growth, thought to be a result of this disturbance. The seedlings at Ambatosaromby, near Antanamarina, are vulnerable to grassland fires.</p> <p>Mitigation: The impact of fires can be reduced by the maintenance of grassland firebreaks around populations, community monitoring for fires and mobilisation to put fires out, environmental education in communities to reduce deliberate setting of fires and burning.</p>		
Grazing by cattle	Impact	MEDIUM
<p>Cattle (<i>zebu</i>) grazing at the Antanamarina <i>tsingy</i> site results in trampling of seedlings and young <i>Tahina</i> plants (<i>zebu</i> are not thought to be grazing on the plants themselves), increasing mortality. The seedling population at Ambatosaromby is vulnerable to trampling by grazing <i>zebu</i>. There is no evidence of grazing <i>zebu</i> entering the forest</p>		

<p>where the main Amparahibe population is found but the isolated individuals on hillsides nearby are more vulnerable to this threat.</p> <p>Mitigation: At the Antanamarina site, fences should be erected and maintained around the tsingy and the seedling site at Ambatosaromby, to prevent zebu accessing the land where the plants are growing.</p>		
Collection for horticulture ('poaching')	Impact	MEDIUM
<p>The collection of seed, seedlings, and young <i>Tahina</i> plants for horticultural purposes is a known threat at both sites. It is worth noting that the production of seed from flowering <i>Tahina</i> individuals is uncommon and unpredictable, and has not been reported for several years. Illicitly collected seed is likely to be poorly collected, prepared, and stored, and is likely to have very low viability/germination rates. Unofficial, unsustainable seed collection risks the healthy regeneration of the already small populations of the species and 'steals' a valuable resource from the local people who protect the plant, which could be used to generate income for the local community. Palm seedlings and young plants are known to have low survival after they have been uprooted and disturbed – such collection will usually result in the death of the plants.</p> <p>Mitigation: It will be important for local communities to monitor and protect populations at both sites, especially adult trees as they start to flower and seedling cohorts, to prevent illicit collection. The coordinated, sustainable collection of seed and appropriate handling and storage will be essential to ensure good germination of the seed. Seed should be distributed to appropriate partners, including commercial outlets, with funds going back to the local communities to fund further conservation activities and development/infrastructure projects for local people. Ecotourism should be promoted at the Antanamarina site to the Antsingilava tsingy population, working with the Anjajavy eco-lodge resort, so that tourists can visit the main <i>Tahina</i> site, in its dramatic, beautiful landscape, whilst employing local people from Antanamarina and ensuring that a proportion of the funds generated go to the local community. There is potential for ecotourism at the Amparahibe site, which is closer to transport links and much more accessible in many ways, and this may help to show the importance (and monetary value) of conserving the <i>Tahina</i> in the wild, <i>in situ</i>, to local people as funds are generated for further conservation work and development/infrastructure projects.</p>		
Stochastic effects, genetic diversity, climate change, and severe weather events	Impact	MEDIUM
<p>The populations of <i>Tahina</i> are small and geographically restricted to fragments of habitat in vulnerable landscapes. Major events such as severe weather events, eg. sustained major flooding, could rapidly lead to the loss of individuals below a sustainable population level. The genetic diversity of <i>Tahina</i> at the Antanamarina site is known to be low, which is likely to make the populations less resilient to environmental change and more susceptible to deleterious genetic inbreeding effects.</p> <p>Mitigation: Populations should be monitored by local communities and census results reported annually. Evidence of problems with plant growth rates, diseases and pests, flowering and fruit production should be reported as soon as possible so that steps can be taken to investigate and hopefully alleviate problems. Efforts should be made to collect and distribute seeds from future <i>Tahina</i> flowerings <i>in situ</i> and <i>ex situ</i> around the world, to ensure that as much <i>Tahina</i> genetic diversity is represented <i>ex situ</i> in botanic gardens and collections around the world. An <i>ex situ</i> living collection of <i>Tahina</i>, representing this genetic diversity, should be created to the south of the Antanamarina site, at the predicted southern edge of the current climatic envelope for the species – at this identified site, part of the private reserve managed by the Anjajavy eco-lodge resort, the climate is likely to become even more suitable for <i>Tahina</i> as global climate change tends to shift climate zones further south in this region.</p>		
Presence of palm weevil larvae in populations	Impact	LOW
<p>At the Antanamarina tsingy site, insect larvae have been reported in the aborted, rotted inflorescences of <i>Tahina</i>. It is not known if the presence of the larvae caused the inflorescences to abort or if the insects infected the material after the inflorescences failed. There is no obvious evidence of infection of living <i>Tahina</i> plants at the site, only the distinctive signs of insect activity on the rotting remains of the aborted inflorescences (and photographs of the larvae inside the tissues, taken sometime after the trunks fell). If the insects are infecting the plants and causing the abortion of the inflorescences, this would be a serious problem for future flowerings – especially because flowerings are infrequent and cause the death of the mature individual, one failed inflorescence represents a significant loss to the population.</p> <p>Mitigation: Populations should be monitored by local people for signs of insect infestation, especially when new inflorescences are developing. The only effective treatment is to remove the infected tissue (the inflorescence, or entire trunk if necessary) and burn it, to prevent the larvae maturing into adults which will move to other plants to lay more eggs. Insects which lay such larvae are known to be present across Madagascar, and occasional (and sometimes significant) pests of palm trees, including coconuts. Eradicating the insects completely is not feasible. It is not known how far the insects can travel but occasional infections may be inevitable – control may be needed to prevent one of these occasional events becoming an infestation which may affect the successful fruiting of <i>Tahina</i>.</p>		

Relevant policies and legislation
International
<i>Tahina spectabilis</i> is not yet listed on CITES (the Convention on International Trade in Endangered Species), although its status as being Critically Endangered, its horticultural desirability and non-availability of seeds (collections of seed have only been made commercially available from two flowerings, the last being eight years ago) makes it a species that should be considered for listing on CITES. The Nagoya Protocol on Access and Benefit Sharing will apply to all future movement of <i>Tahina</i> seed out of Madagascar.
National
<i>Tahina</i> is not specifically listed on any national legislation but collection of material without correct permits from the Ministry of Forestry is illegal.
Local
At both sites, the local communities have forbidden local people from uprooting or damaging individuals (including collecting leaves).

Management notes
The accompanying action plan for this document aims to address the threats outlined above via targeted activities at each site. Main activities are likely to include: <ul style="list-style-type: none"> • Creation and maintenance of firebreaks • Erection and maintenance of fences to prevent zebu trampling seedlings • Community monitoring and reporting on <i>Tahina</i> population demographics, initiation of flowering, possible harvesting activity, and presence of pests • Education and awareness raising of local people, and especially children, about the species and its importance • Dissemination of protocol for seed collection and sustainable sales after future fruiting events • Creation of an <i>ex situ</i> population in the Anjajavy Protected Area • Population demographics and genetic study of species across all sites and species distribution modelling carried out to better understand the biology and future of this species

Stakeholders
<ul style="list-style-type: none"> • COBA/CGT, Antanamarina community – community based association (COBA), Committee de Gestation de <i>Tahina</i> • Amparahibe community • Kew – Royal Botanic Gardens Kew (London, UK) plus Kew Madagascar (Antananarivo, Madagascar) • University of the Sunshine Coast (Queensland, Australia) • VERAMA – cashew plantation company based near Antanamarina, limited company, part of UNIPA group • Anjajavy eco-lodge and reserve (Antonibe province, Madagascar) • PBZT - Parc Botanique et Zoologique de Tsimbazaza (Antananarivo, Madagascar) • WWF - World Wildlife Fund for Nature (Antananarivo, Madagascar) • SNGF – Seedbank National de Graines de Forestiere (Antananarivo, Madagascar) • MBG - Missouri Botanic Garden (Antananarivo, Madagascar) • UA - University of Antananarivo (Madagascar) • UM - University of Mahajunga (Madagascar)

References
<ul style="list-style-type: none"> • Gardiner, L.M., D. Rabehevitra, R. Letsara, A. Shapcott. (accepted, to be published June 2017) <i>Tahina spectabilis</i>: a new discovery in Madagascar ten years on. PALMS (Journal of the International Palm Society) 61(2): 69-82. • Gardiner, L.M., Rabehevitra, D., Letsara, R., & Shapcott, A. (2017). Discovery of a second population of the Critically Endangered Madagascan suicide palm <i>Tahina spectabilis</i>. <i>Oryx</i> 51(2): 205-206. DOI: 10.1017/S003060531700014X. • Dransfield, J., Rakotoarivivo, M., Baker, W.J., Bayton R.P., Fisher, J.B., Horn, J.W., Leroy, B., Metz, X. (2008a) A new Coryphoid palm genus from Madagascar. <i>Botanical Journal of the Linnean Society</i> 156: 79-91. • Dransfield J., Leroy B., Metz X., Rakotoarivivo M. (2008b) <i>Tahina</i>: a new palm genus from Madagascar. <i>Palms</i> 52: 31-39. • Dransfield J., Uhl N.W., Asmussen C.B., Baker W.J., Harley M.M., Lewis C.E. (2008c). <i>Genera Palmarum – the evolution and classification of palms</i>. Kew: Royal Botanic Gardens.

- James, H.J. (2010) Conservation genetics of *Tahina spectabilis*, newly discovered palm from Madagascar. Honours Thesis, University of the Sunshine Coast, Queensland, Australia.

***Tahina* in the media**

- Kew Science blogs, parts 1-3:
 - [Revisiting the Madagascan suicide palm \(part 1\)](#)
 - [Revisiting the Madagascan suicide palm: a decade on \(part 2\)](#)
 - [Revisiting the Madagascan suicide palm: a spectacular discovery \(part 3\)](#)
- [Tahina spectabilis on Kew's website](#)
- [Tahina spectabilis on the IUCN Red List](#)
- [Tahina spectabilis on the Global Trees Campaign](#)
- [Rare palm seeds for sale](#)
- BBC News, 17/01/2008. [Giant palm tree puzzles botanists](#)
- BBC Earth, 21/11/2014. [The 9 Rarest Plants in the World](#)