



Kapisen

Plant Conservation Action group

Newsletter

November 2005

Issue 4

Special Issue on Palms & Pandans

Dear Kapisen readers,

The last weeks have been a real boost for the Seychelles' National Strategy for Plant Conservation. For one thing, the Strategy has now been colourfully printed and is currently available from the Botanical Gardens office at Mont Fleuri (see advert on p. 16). Secondly, the Seychelles' National Strategy was praised for being one of the first of its kind worldwide at an international conference on plant conservation at Dublin (Ireland) (p. 4). Thirdly, it was possible for James Mougall from the Botanical Gardens to attend a course on plant conservation strategies at Kew Botanic Gardens in London (p. 3), thus enhancing our capacity to implement the National Strategy.

This issue of Kapisen focuses on the palms and pandans (or screwpines) of the Seychelles. The reason for our thematic focus is another new publication - PCA has produced a photographic guide to the endemic palms and pandans of the Seychelles (p. 16). This publication is the first in a series of similar booklets that will cover all the native flowering plants of the granitic Seychelles.

Palms and pandans are unique plants with an ancient origin. The oil palm, coconut palm and date palm have great importance in many countries. Historically, copra production from coconut palms was the mainstay of the Seychelles economy for more than a century. And of course, Seychelles is famous for one particular palm, the Coco-de-mer, once called the Tree of Knowledge in the Garden of Eden! Fossil evidence of palms and pandans goes back to the Cretaceous period some 100 million years ago, when dinosaurs still dominated the world. No wonder that visitors to the Vallée de Mai Coco-de-mer forest and to Mare aux Cochons swamp with Vakwa parasol pandans often feel as if they are experiencing pre-historic times.

There are articles in this Kapisen about conservation biology, habitat restoration and sustainable use as they relate to palms and pandans. The articles also reflect targets of the National Strategy - firstly the diversity (Target 1) of the palms and pandans and their relationships with animals. Lindsay Chong-Seng presents the less well known pandans of Seychelles - those from Aldabra (p. 7), while Pat Matyot reveals what an important habitat palms and pandans are for the insects of Seychelles (p. 10). Then Eva Schumacher and Christoph Kueffer take us to the Mascarene Islands with their 11 palm and 25 pandan species (p. 8). Although this is greater diversity than in Seychelles, it is still much less than Madagascar, the giant of palm and pandan diversity

in the region, with at least 165 endemic palms and about 100 endemic pandans!

Habitat management (Targets 3c, 6b) is the focus of three other articles. Céline Ramseier and Sabine Mannes present a new habitat restoration project on North Island that aims to slowly transform a former coconut plantation back into native forest (p. 6). By contrast, Didier Dogley describes La Réserve as one of the very few remaining native palm forests on Mahé that needs urgent protection (p. 5). Karl Fleischmann makes the link with Target 7 (invasive species) by describing research that shows that *Lantana camara* seedlings successfully compete with *Cinnamomum* in shaded forests (p. 12).

Finally, two articles talk about the use of palms. Willie André and Katy Beaver recall the multitudes of traditional uses of palms and pandans (p. 13), while Frauke Fleischer-Dogley emphasizes the importance of ensuring sustainable management of the unique Coco-de-mer (Target 8c) (p. 14).

The palms and pandans of Seychelles are at the heart of Seychelles' nature, culture and economy and must be safeguarded so that they can still play these roles in the future!

Katy Beaver, Christoph Kueffer & Eva Schumacher,
Editors

The electronic version of Kapisen can be ordered from boga@seychelles.net or downloaded from www.geobot.ethz.ch/publications/books/kapisen

Content

Editorial	2
Plant Conservation	3
International	4
La Réserve	5
Rehabilitation on North Island	6
Pandans of Aldabra	7
Mascarenes' Palms & Pandans	8
Insects and Palms & Pandans	10
Palms for Habitat Restoration	12
Traditional Use	13
Management of Coco-de-Mer	14
Strategy and Booklet Advert	16



Palms and Pandans growing naturally at Vallée de Mai (L Chong-Seng).

PCA member attends course at Kew Royal Botanical Gardens

By James MOUGAL
Botanical Gardens Section (MENR)
j.mougal@env.gov.sc

In July 2005 I attended an International Diploma course in Plant Conservation Strategies held at Kew Royal Botanical Gardens, UK through a grant from the Lennox-Boyd Memorial Trust. There were participants from across the globe, from China to the Czech Republic, from Ethiopia to Hawaii. Our fields of work varied from sustainable use of forest products (timber, medicinal plants...), DNA and gene banking, access and benefit sharing (traditional knowledge), to biodiversity assessment. It was a stimulating forum in which participants could share their personal experiences of different plant conservation projects. The 8 weeks course gave us the chance to reflect on how those projects are contributing towards achieving the five main objectives of the Global Strategy for Plant Conservation (GSPC) and the various articles under the Convention on Biological Diversity (CBD). The lectures were enlightening and experts from Kew, IUCN, Plantlife International and BGCI introduced different international programmes and conventions or guidelines that address plant conservation issues globally. We visited some of the

UK national initiatives in plant conservation, notably the work of English Nature and projects with an international dimension such as the Millennium Seed Bank, Kew Botanical Gardens and Eden Project. On a more technical level the course covered some of the advanced techniques in plant conservation such as DNA and gene banking, in-vitro/tissue culture, increasing use of GIS in biodiversity monitoring and the cost of rare plant rescue projects. Overall this course was enriching for me in terms of knowledge gained, contacts established and sharing Seychelles' experience in the development of our own National Strategy for Plant Conservation, which excited great interest.



The workshop session on red data listing facilitated by Craig Hilton-Taylor (IUCN Red List Programme Officer, left). James is second from the left (P Massey).

Seychelles at the Forefront of International Conference!

Denis MATATIKEN, Eva SCHUMACHER
& Christoph KUEFFER

boga@seychelles.net, evaschu@gmx.ch
kueffer@env.ethz.ch

The Global Partnership for Plant Conservation (GPPC) was launched in 2004 to support the implementation of the Global Strategy for Plant Conservation (GSPC). From the 23rd to the 25th of October, the GPPC organized its first international conference at the National Botanic Gardens in Glasnevin (Dublin, Ireland). The goal of the conference was to bring together plant conservation scientists, policy makers and practitioners from throughout the world to share methods and results that will advance plant conservation measurably, and to provide and share experiences in plant conservation, in support of the implementation of the Global Strategy.

The conference was attended by over 100 participants from more than 37 countries. The initiators of the Seychelles' National Strategy for Plant Conservation (NSPC) – PCA and Botanical Gardens (MENR) – were represented by three persons. Denis gave a keynote presentation on the process, achievements and future challenges of the NSPC. Seychelles was given this prestigious opportunity because we were one of the first countries to develop our own national strategy, and the first small island developing state (SIDS) to do so. An important conclusion of the conference was that more national strategies are needed. Seychelles may help with initiating national strategies in the Western Indian Ocean region or among SIDS countries modelled on the Seychelles' strategy. Eva and Christoph presented a poster on the collaboration of the Geobotanical Institute with organisations conducting plant conservation work in Seychelles. They emphasized that research institutions are a valuable partner for the implementation of the GSPC, not just through research but also by supporting capacity building, education and actual plant conservation work. For PCA the conference was a great opportunity to contact potential partners for the implementation of all NSPC targets.

The conference was very challenging and motivating. We mention here only a few of the discussed topics with particular relevance for Seychelles. For Objective 1 (Understanding and Documenting Plant Diversity), a major breakthrough of the conference was the announcement by Jane Smart (IUCN) that

streamlining the red data listing process may help to speed it up. She proposed a simplified protocol that distinguishes only between the four categories 'extinct', 'threatened', 'not threatened' and 'data deficient'. This does not mean that IUCN is giving up the more detailed methodology though, so Seychelles is still encouraged to continue with its in-depth red data list project. For Objective 2 (Conservation), one working group focused on invasive species and one conclusion was that a global database on best-practice invasive species management plans is needed. For Objective 3 (Sustainable Use) it was emphasized that sustainable use is a complex issue involving many sectors and actors, so that national solutions are particularly relevant. For Objectives 4 and 5 (Education and Capacity Building), it became clear that education has to reach people from all walks of life. The Eden Project was praised for their success in attracting a very broad audience. Seychelles especially could play a role by teaching tourists about plant conservation during their holidays. It was also said that national champions or celebrities are needed to represent plant conservation.

Who could this be in Seychelles?



Group picture from the conference (Plants 2010).

The meeting in Dublin also led to concrete outcomes. The Global Partnership was formalized and Peter Wyse Jackson was confirmed as the chairman. The full proceedings are available on the web* as a first step towards a toolkit for plant conservation that will be developed in the near future to facilitate the implementation of the GSPC. Last but not least, one thing was obvious for all participants who gathered in the most beautiful Botanic Gardens in Glasnevin (Dublin): Irish hospitality is world class!

* <http://www.plants2010.org>

A Palm Forest of Exceptional Value

By Didier DOGLEY

PCA Chairman

didier21@hotmail.com

It may be hard to believe but one of our most amazing and spectacular palm forests exists not on Praslin but on Mahé. In many aspects its beauty rivals that of Vallée de Mai, in spite of the absence of Coco-de-mer. Five of the six endemic palms of Seychelles, i.e. Latannyen fey, Latannyen lat, Latannyen oban, Latannyen milpat and Palmis thrive on the slopes of La Reserve and in-between massive boulders. The current area of palm forest is probably only a small remnant of the original forest, which was cleared to make way for agriculture and forest plantations.

But La Reserve has more than just palms. It contains a high diversity of other endemic and indigenous plants, several of which are highly threatened. A whole range of native plants exist, representing low to high altitude vegetation types and including those of the mist forest, which occur here at a much lower altitude. Among the most graceful are the pandans; both Vakwa maron and Vakwa montanny are well represented. Apart from many excellent exemplars of native trees, shrubs and herbs, the abundant rainfall and high humidity encourage the growth of abundant mosses, ferns and lichens. Many of these are epiphytes growing on rocks and trees.

Because of the high diversity of plant species, La Reserve supports a number of endemic and indigenous animals, including birds, bats, reptiles and insects. Among the endemic bird species are the Seychelles Blue pigeon, Sunbird, Kestrel and Bulbul. Perhaps the most interesting creatures found in La Reserve are the endemic chameleon, stick insects and land snails.



Endemic *Pachnodus* snail found in La Reserve (E Schumacher).

The vegetation composition of La Reserve also includes a wide variety of introduced species. Within the lower part of the forest there are various plants that were introduced for economic reasons, such as bamboo, cinnamon, cardamom and wild pineapple.

And, it must be pointed out that all is not well in La Reserve. There are various threats which pose a danger to the whole ecosystem. Well known invasive species have established and thrive within the reserve. Species such as Bracken fern and Prindefrans are localised; but others such as Wild guava, *Alstonia* and the creeper *Merremia peltata* are more widespread and pose a real threat. *Merremia* seems to have established a real foothold in the reserve and its rate of invasion should be of real concern to the authorities. In addition, several Bwa dou trees have been felled by unscrupulous collectors of medicinal plant material. Other highly threatened species may be subjected to the same fate as no effort is being made to apply sustainable collection practices.



Palm forest at La Reserve (E Schumacher).

La Reserve is an important component of our natural heritage which deserves our support and protection. It is a place of exceptional natural beauty with excellent vistas over both the western and eastern side of Mahé. Currently the management of La Reserve is mainly limited to maintenance of the new trail which runs along the lower part of the forest. Unfortunately no management plan exists, although there is a crucial need for one. The closure of the older trail for fear of degradation of the more sensitive areas highlights the need to establish clear boundaries and different management zones with appropriate management regimes. The present trend within the Division of Environment, towards co-management of important biodiversity sites, is considered by PCA to be a move in the right direction. It will canvass greater support for protection of sites, wider participation and advocacy from the general public. However this needs to be properly planned and coordinated to ensure that best management and conservation practices are applied at all times.

Vegetation Rehabilitation and Monitoring on North Island

By Sabine MANNES & Céline RAMSEIER
Geobotanical Institute, ETH Zurich (Switzerland)

smannes@student.ethz.ch

celiner@student.ethz.ch

Everybody who visits North Island for the first time is taken aback by the huge number of coconut palms growing on the island. This is due to North Island's history as a coconut plantation in the 19th and 20th centuries. After some years of relative neglect, in 1997 the island was purchased by a group of shareholders who built North Island Lodge, a tourist establishment. They realized that the island's flora and fauna was in a bad condition – generally speaking, over 90% of the landscape was sculptured by man. Fortunately the North Island Lodge management is committed to rehabilitating the island, working together with local experts.



Pandanus balfourii (C Ramseier & S Mannes).

Rehabilitation is defined as the return of an ecosystem to a close approximation of its condition prior to disturbance. This process is time consuming and will last many years. The work we did on North island is the first step in this long-term process. It forms part of the Rehabilitation of Island Ecosystems project led by the Island Conservation Society and funded by FFEM (French GEF), the objective of which is to rehabilitate a number of islands in Seychelles inclu-



Field Work on North Island (C Ramseier).

ding North Island. It is widely accepted that the regular monitoring of the island vegetation together with appropriate ecological rehabilitation are key-factors in maintaining the astonishing biodiversity and unique flora of the Seychelles. Since an ecosystem has many different aspects, groups and experts from various scientific branches such as ornithology, botany, entomology etc are involved in such a project. Within the assignment PCA is responsible for the vegetation part.

The aim of our study is firstly to develop a vegetation rehabilitation scheme for North Island and secondly to set up a monitoring methodology to observe the process of rehabilitation. The project is undertaken with the scientific support of the Geobotanical Institute, ETH Zurich. We, Sabine Mannes and Celine Ramseier are the first two students from the ETH working in this project under the supervision of Dr. Karl Fleischmann. We are both studying environmental sciences, an interdisciplinary university training focused on sustainability and environmental conservation.

At present the remains of the former coconut plantations on North Island are still very well visible: Coconut palms grow naturally on the beach fringe. On North Island, however, they grow on the entire plateau and on the hills as well. As very strong competitors they have become a problem for other native plants. An adult coconut palm produces more than forty coconuts a year which makes the juveniles a serious problem. As part of the rehabilitation of North Island some of these coconut palms are to be replaced either by endemic palms or indigenous trees. *Deckenia nobilis*, *Phoenicophorium borsigianum* and *Nephrosperma vanhoutteana* are already cultivated in the nursery, *Verschaffeltia splendida* will hopefully be propagated soon. About two years ago North Island's landscaping team started with the planting of endemic palms along the road to the west beach.

Aldabra Pandans

According to the present vegetation management plan this work will be continued this year. Palms are very suitable for rehabilitation because they are robust, undemanding and fast-growing.

Among the 13'000 juvenile plants that are in the nursery at the moment there are also various native *Pandanus* species. To see fully grown *Pandanus balfourii* on North Island, Bernica is the best place to go. This granitic hill with large glacia areas seems to be a very suitable habitat for *P. balfourii*. Around the marshes we find quite a lot of *P. hornei*, most of which have been planted in the last two years.

For the rehabilitation of North Island not only the above mentioned species are important. Beside palms and pandans, a lot of dicotyledonous trees are cultivated in the nursery.

Aldabra Pandans

By Lindsay CHONG-SENG
Seychelles Islands Foundation (SIF)
sif@seychelles.net

Aldabra atoll has a completely different geological history from the granitic islands. It has a more recent origin and is formed entirely of limestone. The plants are mostly of African/Malagasy origin. Vast areas are covered with Pemphis scrub and mixed scrub, and the lagoon is fringed with mangroves. There are a significant number of endemic species and sub-species, which is unusual for an atoll and partly a result of the large and varied terrain of Aldabra.



Phalanges (fruit sections) from 2 trees of *P. tectorius* (right) showing typical variation in size and structure, alongside those of *P. hornei* (top left) and *P. sechellarum* (bottom left) (K Beaver).

We would like to thank PCA and Karl Fleischmann for giving us the opportunity to do our practical work in the Seychelles. Our sincere thanks go also to the manager of the North Island Lodge, Bruce Simpson, for accommodating us on the island and supporting our fieldwork. We do appreciate the prompt reactions to our recommendations concerning the vegetation monitoring and the vegetation management plan.

Rehabilitation after Gilmour, D.A. et al. 2000.

To re-establish the productivity and some, but not necessarily all, of the plant and animal species thought to be originally present at the site. For ecological or economic reasons the new habitat might also include species not originally present at the site. The protective function and many of the ecological services of the original habitat may be re-established.



P. tectorius growing next to a freshwater pool at Aldabra (L Chong-Seng).

Pandans are found as components of the mixed scrub communities. The first person to work on them was H St.John, who based his taxonomy on specimens collected by F R Fosberg. In 1974 he described six separate species from Aldabra, based mainly on the shape and sculpturing of the fruit sections (phalanges). However, by 1980 Fosberg and Renvoize had reduced the number of species to just two: *Pandanus aldabraensis* and *P. tectorius*. *P. aldabraensis* is endemic and known only from two areas of the atoll, while *P. tectorius* is now understood to be notoriously polymorphic "as in other parts of its vast range" - in other words, there is great variability in the morphology of the plants.

References:

- St. John, H. 1974.** Revision of the Genus *Pandanus* Stickman. Part 37 *Pandanus* on Aldabra Islands, Indian Ocean. *Pacific Science* 28 (1) 83-100
- Fosberg, F.R. and Renvoize, S.A. 1980.** The Flora of Aldabra and neighbouring islands. *Kew Bulletin Additional Series VII*, HMSO

Mascarenes' Palms and Pandans

By Eva SCHUMACHER & Christoph KUEFFER

Just like in Seychelles, palms and pandans are a characteristic feature of the flora of the Mascarenes (La Réunion, Mauritius, Rodrigues).

There are 11 endemic palms, and even one problematic invasive palm (*Livistonia chinensis*). In Réunion, the identity of a new species of *Acanthophoenix* is currently under discussion. For now it is called 'Palmier Roussel' after the private property where it has been discovered. Many of the endemic palms are highly threatened. One reason is that a typical habitat for palms, the dry lowland palm savannahs, has almost completely disappeared. Another reason is overexploitation. Many palms are harvested for the palm heart or for roof thatching.

Endemic pandans are even more diverse than palms in the Mascarenes. There are 25 in all, with 20 of them in Mauritius. The chapter of the Flora of the Mascarenes describing the pandans was published recently, in 2003. Since then, two species that were thought to be extinct have been rediscovered in Mauritius. But still 5 pandan species are thought to be extinct and 5 more critically endangered in Mauritius!

It is interesting to compare the diversity of palms and pandans between Mauritius and the granitic Seychelles. There are 6 palm and 4 pandan species in Seychelles, but 7 palm and 20 pandan species in Mauritius. The higher diversity in Mauritius may be explained by the larger land area and the proximity to the other Mascarene islands, but why a large difference for the pandans and not for the palms?





7



8



9



10



11

endemic to...

- La Réunion
- Mauritius
- Rodrigues
- La Réunion & Mauritius

● Rodrigues

1 'Latanier bleu' (*Latania loddigesii*) is endemic to Mauritius and today found in the wild only on a few small offshore islets. It is cultivated together with other rare endemic palms and pandans on the conservation island 'Ile aux Aigrettes' managed by the Mauritian Wildlife Foundation (MWF).

2 *Dictyosperma album* var. *conjugatum* is one of three endemic varieties of this species. This variety exists in the wild only on Round Island. The species is widely planted in Mauritius as an ornamental and for the edible palm heart.

3 'Latanier rouge' (*Latania lontaroides*), is a popular ornamental palm in La Réunion but was thought to be almost extinct in the wild until very recently when a remnant patch of Latanier rouge forest has been found (see Plant Talk 36, 2004).

4 *Pandanus utilis* is widely planted in the Mascarenes as well as in Seychelles for producing handicrafts such as baskets. In 1979, it was recognized that this species is endemic to the Mascarenes rather than to Madagascar. In Seychelles it is called 'Vakwa sac'.

5 'Palmiste marron' (*Hyophorbe verschaffeltii*) is endemic to Rodrigues. It was a typical palm of the lowland dry palm savannahs but is now very rare.

6 'Pimpin' (*Pandanus montanus*) is a small pandan of 3-5 m height, endemic to La Réunion. It is the most common pandan in La Réunion and occurs in upland habitats from 400-1700 meters.

7 *Pandanus heterocarpus* is an important species for habitat restoration projects in Rodrigues. It is sometimes called 'Vakwa parasol' just like *Pandanus hornei* in Seychelles.

8 *Pandanus vandermeeschii* is endemic to Mauritius and still relatively common. The Aldabra pandan *Pandanus aldabraensis* looks rather similar and was first described in 1897 as *P. vandermeeschii* by Schinz.

9 'Palmiste rouge' (*Acanthophoenix rubra*) is endemic to La Réunion and Mauritius. It is highly threatened because the palm heart is appreciated as a delicacy just like that of the closely related 'Palmis' (*Deckenia nobilis*) in Seychelles.

10 'Latanier jaune' (*Latania verschaffeltii*) is the third Latanier of the Mascarenes. This one is endemic to Rodrigues. The genus *Latania* belongs to the same taxonomic palm group (*Borasseae*) as the Coco-de-Mer (*Lodoicea*) in Seychelles.

11 *Hyophorbe amaricaulis* is the most threatened plant in the world. It is known from only one individual that is protected by a fence in the Botanical Garden of Curepipe (Mauritius). Ex situ propagation has failed so far.

12 Acknowledgements: We would like to thank Christophe Lavergne & Gaëtan Lerceteau in La Réunion, Claudia Baidier, Vincent Florens & Ruth Bone in Mauritius, and Richard Payandee in Rodrigues for guiding us to the attractive palms and pandans of the Mascarenes, and CL and VF also for comments on an earlier version of this article.

Insect denizens of the palm and pandan forests

By Pat MATYOT
Pat.Matyot@sbc.sc

When the British entomologist Hugh Scott visited Seychelles in 1908-1909, he was struck by the large portion of the insect fauna that is associated with the endemic palms and pandans. He referred to them frequently in both his diary and the scientific papers that he published later. For example, he recounted that while wandering around the mist forests in the upper reaches of Mahé and Silhouette he found the steep mountain slopes to be useful “because, owing to the exceedingly sharp angle of the surface of the ground, one is enabled to survey and reach the upper surface of the foliage, and the tops of small palms and other trees which are rooted some feet below”. There he found “various curious forms of Hemiptera [bugs], parasitic Hymenoptera [wasps], and Coleoptera [beetles] ... sitting exposed to the light on top of the green roof of foliage, especially on the leaves of the small *Roscheria* palms” (‘Lantannyen oban’). His diary contains the following entry for November 28-29, 1908: “Cut down a fairly tall male Coco-de-mer (in the Vallée de Mai on Praslin). Got many good Coleops [beetles] from leaf-bases; large black scorpion in rotten outer part of leaf-bases...”



The stick insect *Graeffea seychellensis*
(K Beaver).

There are several reasons why palms and pandans should harbour a distinct, specialised insect fauna. First of all, it is reasonable to assume that the older a plant is in terms of geological age, the more time would have been available for “co-evolution” to take

place and for insects to become adapted to feeding on that plant (this involves overcoming its chemical defences). We know, from fossil records, that the pandan family, the Pandanaceae, is an ancient family dating from over 100 million years ago (the “early to mid-Cretaceous”, when Madagascar and Seychelles/India had already separated), while palms first appeared at least 80 million years ago (the “late Cretaceous”, at a time when Seychelles and India were probably still linked together).

Then there is the distribution and abundance of palms and pandans: widely distributed and abundant plants tend to have more insect species that can find and colonise them than those that have a more restricted distribution or that are rarer. Moreover, the large leaves of palms presumably make them easy targets for flying and wind-dispersed insects; insects can also move along a long palm or pandan leaf without interruption, whereas moving from one separate small leaf to another on other trees must be more problematic.

Another important factor is the structural complexity of palms and pandans: their “architecture” offers a great variety of microhabitats that insects can occupy – leaves pleated to produce ridges and furrows or folded in a rooflike (reduplicate) manner; overlapping leaf bases that can retain humus and moisture; persistent leaves that remain attached to the trunk even after they are dead; moss-covered trunks that also retain moisture; inflorescences enveloped by a spathe; stilt roots, etc. Even the dead leaves and spathes that are shed and fall to the ground, being structurally complex, provide shelter as well as food to many insects.

The insects found on palms and pandans can be grouped according to the different micro-habitats that they occupy (a micro-habitat being a “small scale habitat” with its own ecological conditions or micro-climate within a wider habitat). On the surface of the leaves we may find “tourist species” – insects that do not feed on the plant and have no lasting association with it but come there for temporary shelter, to bask in the sun, for sexual display to attract a mate or simply in transit on their way to another plant. The large Alluaud’s stick insect (*Carausius alluaudi*) is sometimes encountered in this situation. However, many of the insects observed on the leaves of palms and pandans are actually leaf-eaters, and specialised ones at that, in the sense that they do not feed on the leaves of most other plants. They include the winged stick insect (*Graeffea seychellensis*), Gardiner’s grasshopper (*Enoplotettix gardineri*) and the so-called six-spotted bush cricket (*Odontolakis sexpunctatus*). Each of these produces distinctive

Insects & Pandans

feeding marks and it is interesting to examine leaves to determine which species have attacked them.

One of the most interesting micro-habitats provided by palms and pandans, first discovered by Scott on Silhouette in 1908, consists of their concave, overlapping leaf-bases where moisture may be trapped. These form what biologists call “phytotelmata” or “plant-held waters”, like the liquid contents of tree holes, bamboo internodes and the “pitchers” of the pitcher plant or ‘lalyann potao’ (*Nepenthes pervillei*). Scott found while examining these leaf bases that “between them is a certain amount of muddy slimy humus, the dwelling-place of a considerable fauna, some of the members of which appear to inhabit these palm-heads only, not having been found by me anywhere else”.



Micro-habitats in juvenile Coco-de-mer and Latannien fey (K Beaver / L Chong Seng).

Palm-heads and heads of ‘Vakwa parasol’ (*Pandanus hornei*) and ‘Vakwa maron’ (*Pandanus sechellarum*) yielded over 75 different species of insect, most of them endemic to Seychelles, as well as earthworms, leeches, snails and woodlice. Some of the insects include forms that are usually considered to be aquatic, such as the water-beetle *Copelatus pandanorum* and the “rat-tailed” larva of the hover-fly *Eristalodes sechellarum*, so-called because of the snorkel-like “tail” that enables the

larva to take in air from above the liquid in which it is submerged. In recent years there have been additions to Scott’s list: I have found the cockroach *Desmosia alluaudi* among the dead outer leaf bases of the Coco-de-mer (*Lodoicea maldivica*) in the Vallée de Mai on Praslin and another cockroach, *Distichopsis stylopygae*, in similar situations on the ‘Vakwa maron’ at the summit of Morne Seychellois on Mahé. Two cockroaches belonging to the genus *Hololeptoblatta*, *H. pandanicola* and *H. minor*, live not between the outer leaf bases but between the youngest, innermost leaves of pandans: Scott noted “their extraordinarily flattened form, fitting them to enter the narrowest spaces between the screw-pine leaves”. The difficulty in catching one of these cockroaches as it slips effortlessly into the inner recesses of a pandan head has to be experienced to be believed!

Other insects are found on the main stems or trunks of palms and pandans. I have frequently observed the groundhopper *Ocytettix pupulus*, easily mistaken for a small flake of lichen, at the top of palm trunks just where moisture oozes out from the leaf bases. As for the attractively spotted planthopper *Privesana infusca* it often lands and rests on the trunk and stilt roots as well as the fallen leaves of ‘Vakwa parasol’, although it may actually suck sap from living leaves.

There is much scope for further research on the insect fauna of palms and pandans in Seychelles. Which insects are obligate associates (cannot survive elsewhere) and which are only frequent (opportunistic or facultative) associates? Which species are associated with which species of palm or pandan? The answers to these questions, like the life histories of most of these insects, have yet to be worked out. Of course, it is vital that we keep on protecting our remaining palm and pandan forests, because their destruction would mean the disappearance of these unique animal communities.



Gardiner's grasshopper (*Enoplotettix gardineri*) (K Beaver).

The significance of *Latanier feuille* in the struggle against invasive alien plants

By Karl FLEISCHMANN
Geobotanical Institute, Zürich, Switzerland
karl.fleischmann@env.ethz.ch

There is no doubt that the ecological and economic impact of invasive alien plants on the unique but fragile island ecosystems in the Seychelles is devastating. Discussing reasons for this disaster is one thing, but to look into potential diminishment of the problem is another. This article deals with the promising competitive ability of *Latanier feuille* (*Phoenixophorium borsigianum*) against the invasive Cinnamon in intermediate and high altitude forests.



The endemic palm *Latanier feuille* (*Phoenixophorium b.*) shows an outstanding potential to establish itself in secondary and severely disturbed forests (K Fleischmann).

In the Seychelles the endemic palm *Latanier feuille* and the aggressively invasive alien Cinnamon (*Cinnamomum verum*) are competitors in a series of habitats. I have investigated to which extent demographic variables (growth rates, mortality and recruitment) are important determinants of the competitive ability of the two species. Furthermore, I have investigated whether competitive relations between Cinnamon and *Latanier feuille* can change with light intensity and to what extent native plants like *Latanier feuille* can potentially outcompete Cinnamon in important biodiversity sites on Mahé.

The analysis of the above mentioned demographic variables was performed in 1 m² sampling plots in forests with different light climates. The light climate was characterised as the fraction of the incident diffuse light above the canopy that is transmitted by holes in the canopy, i.e. the openness of the canopy (diffuse site factor, *diffsf*). The three studied light climates were: shaded (high canopy sites, *diffsf* < 30%)

partially shaded (low canopy sites, *diffsf* = 30–45 %) and gaps (*diffsf* > 95%).

It was seen that competition between Cinnamon and *Latanier feuille* was greatly influenced by the amount of available light. *Latanier feuille* responded significantly better (in terms of growth rates of leaf area) to very low light levels than did Cinnamon. Both species showed no further response to direct sunlight in gaps compared to partially shaded sites.

It seems that *Latanier feuille* and probably other palms like *Deckenia nobilis* and *Roscheria melanochaetes* act as a filter in the understory affecting the distribution and abundance of establishing Cinnamon seedlings. The mortality of Cinnamon was strongly influenced by the level of available light, while *Latanier feuille* showed no such correlation. Unlike *Latanier feuille*, Cinnamon could establish and regenerate only in light levels of >7.5 % diffuse site factor. This means that a species like Cinnamon tends to have a higher competitive ability with increasing levels of light. Seedling performance of *Latanier feuille* was significantly reduced in areas of above average light. This means that, unlike Cinnamon, the endemic *Latanier feuille* tends to have higher competitive ability in shadier forest sites.

Canopy closure seems to promote seedling germination of *Latanier feuille* through changes in the environmental conditions in the forest floor. It is known that reduced light levels and an associated increase in soil moisture content can have a positive effect on seedling germination and growth of certain tropical species. This is obviously true for *Latanier feuille* for which seedling growth did not necessarily increase with higher levels of light.

Latanier feuille can be considered a shade specialist. Its capacity to grow even at very low light levels makes this palm particularly successful in competing with Cinnamon and probably other invaders like *Adenantha pavonina*, *Tabebuia pallida*, *Hevea brasiliensis* in shaded forest areas. In terms of conservation planning, it seems advisable to implement these promising results in the attempt to reduce the negative impact of invasive plant species in Seychelles' National Parks.

References:

- The scientific details of this study can be found in :
- Fleischmann, K. 1999.** Relations between invasive *Cinnamomum verum* and the endemic *Phoenixophorium borsigianum* on Mahé island, Seychelles. *Applied Vegetation Science* 2:37-46.
- Fleischmann, K. 1998.** Competitive ability and seedling establishment of *Cinnamomum verum* and *Phoenixophorium borsigianum*. *Phelsuma* 4:1-22.

Traditional Uses of Endemic Palms and Pandans

By Willie ANDRE & Katy BEAVER
Plant Conservation Action group (PCA), Seychelles
kbeaver@seychelles.net

When settlers arrived in Seychelles in the late 18th Century, they found many uses for the native plants, including the endemic palms and pandans. Shelter was a primary consideration and Latanniyen fey leaves were used for thatching house roofs. On Praslin the much larger Coco-de-mer leaves were utilised, with their huge leaf stalks creating attractive ornamental roof ridges and corners. However, W H Est-ridge in 1885 reported that “although much cooler, thatched houses are not so pleasant for hot climates on account of the centipedes and other pests they harbour”! Palm leaves could also be used for house walls and inner partitions, but more substantial walls were created from lathes ('lat'). The trunk of a Latanniyen lat was split into four and the softer inner part removed, leaving one inch thick lathes which could be arranged in attractive patterns. The long aerial roots of Vakwa maron were also utilised in this way but because of their smaller size were split into just two pieces (known as 'lati').



Praslin lady creating a hat with a long plait made of soft immature leaf of Coco-de-mer (L Chong-Seng).

The trunks of other palms were not normally used for house construction but Coco-de-mer was said to be “sufficiently firm, except in the centre, to be used for many domestic purposes” (James Prior 1811). Hence it was made into simple furniture, boxes and walking sticks (remember most people travelled overland on foot!).

Being able to transport and store water was essential. Not surprisingly, the huge nuts of Coco-de-mer palms were utilised for water storage, as were the large leaf bases of Palmis, which when fresh are pliable and can be pinned up to form containers ('basen'). However, a more common use for these leaf



Modern thatching the traditional way - using Latanniyen fey leaves and Coco-de-mer 'zig' string. The photo shows the inside of the roof (K Beaver).

bases was as “raincoats” for fishermen, who could cover themselves when they went fishing at night (during the day the leaf material would dry and become hard). Fishermen also made use of Coco-de-mer nuts to store water, and half nuts made useful bailers when rough seas slopped water into their pirogues. Back on land, whole Coco-de-mer nuts were often used as containers for fermenting home-brew ('lapire') because of the lack of calabash. In fact Coco-de-mer nuts, being hard and durable, could be fashioned into many utensils such as scoops, cups, spoons and dishes, collectively known as 'Vesel de Pralen' (Praslin crockery).

Some palms produce edible parts, such as the growing heart or “cabbage”. That of Palmis was found to taste excellent, especially prepared as a salad with a dressing. However, unlike the coconut palm, the fruits of the endemic palms and screw pines are not edible (except by certain birds and fruit bats), with one exception - the jelly found within young Coco-de-mer nuts. This was considered a dessert delicacy and often served with a fine liqueur. When a Coco-de-mer fruit is ripe (which in itself takes about 7 years), the inside is full of hard “vegetable ivory”. Unfortunately the ivory is too brittle to be carved into ornamental sculptures but was used to make the “dots” in dominoes, a favourite pastime for Seychellois.

As if that wasn't enough uses for Coco-de-mer, the outside husk could be made into rope, but even more prized were the 'zig' (main leaf veins) from young leaves, which formed pliable string for sewing thatch to roof timbers. Young unfurled flexible Coco-de-mer leaves were woven into mats, bags, hats, baskets, fans, etc., a craft which became exquisitely refined under the influence of Antoine Benezet, who settled in Seychelles after a period of imprisonment during the Napoleonic Wars, during which time he learnt the art of preparing and weaving fibres into fine articles.

There is one other part of the Coco-de-mer palm which you might think had little use - the indumentum, a kind of "fluff" not unlike brown cotton wool, which is found on the underside of newly opened leaves. This was used both for dressing wounds and for stuffing pillows and mattresses - but how long would it take to find enough of this stuff to fill even a child's mattress? Necessity is the mother of invention!

Such was the poverty of the majority of the population that the use of these natural materials represented the only way that people could manage to survive. The extensive exploitation of *Latanyen lat* and *Vakwa maron* for house construction went on until relatively recently and must have greatly decreased the natural populations of these trees, even though habitat destruction also had a major impact. The drawback of using trunks and palm hearts is that the whole palm tree has to be felled and a palm cannot regenerate from new shoots as can some broad-leaved trees. And a *Vakwa maron* depends on its aerial root for support, as the main trunk disappears. Also, human utilisation of Coco-de-mer nuts, for whatever purpose, means that those nuts cannot grow into new trees - it is that plain! As a result, the removal of all nuts from most areas has resulted in an uneven distribution of age groups, as well as a much smaller population. Coco-de-mer trees are very slow

growing. What about the future?

However, it IS possible to harvest some plant material sustainably - *Latanyen fey*, for example, can be harvested by taking only mature leaves, allowing the youngest leaves and central palm heart to continue growing. By contrast, the use of immature Coco-de-mer leaves for weaving and thatching-string must be done with extreme care, to avoid damaging the growing heart. How many palms were killed in this way on Praslin over the years? If just one leaf is removed, the next one may not appear for many months and the loss of even one leaf from a bearing female palm can reduce its production significantly. Although the bulk of Coco-de-mer nut production is commercialised, information collected from a recent survey on Praslin indicates that the existing stock of juvenile trees is 3.5 times greater than the total number of mature trees (male and female) currently in production. This situation needs to be maintained and improved upon if nut exploitation is to be sustainable (see also below).

For the sake of our unique plant biodiversity, any continuing exploitation of palms and pandans MUST be done in a sustainable way. It is also essential that all plants in core zones of protected areas are left completely undisturbed.

Achieving sustainable management of *Lodoicea maldivica* – a question which needs urgent attention

By Frauke FLEISCHER-DOGLEY
Plant Conservation Action group (PCA), Seychelles
frauкеfd@yahoo.co.uk

Lodoicea maldivica (Coco-de-mer) is probably the best known endemic plant species of Seychelles for locals and visitors alike. It is a spectacular species that has evolved over time into a giant of the plant world due to its isolation on a few remote islands. As a result of this evolution *Lodoicea's* ability to disperse has been much reduced, for the fruits and seeds are so large and heavy that their only dispersal mechanism is gravity.

The amazing nature of both the tree and its seeds has captured the interest of a wide range of people, from rulers such as the Hapsburg Emperor Rudolph II to General Gordon of Khartoum; and from the olden-time pilgrims to Mecca, to the first Seychelles settlers, whose traditional uses of the palm were many and varied (see p 13). Nowadays, the seeds are still greatly valued and therefore harvested. Alt-



Coco-de-mer fruits (L Chong-Seng).

hough this harvest is regulated to some extent, according to records the collection of nuts has considerably increased in recent years, e.g. from 1214 nuts in 1996 to 2732 nuts in 2004. In addition both the seed and the tree have become tourist attractions, including the forest habitat of which *Lodoicea* is the dominant element.

Another more recent pursuit is the exploitation and export of Coco-de-mer kernels to the Far East, as it is believed to be an aphrodisiac. There is a danger through new information technology and good

marketing skills, that a demand may be created which cannot possibly be met. When searching on the worldwide web for the two words aphrodisiac and Coco-de-mer, one search engine produced 959 results! One webpage stated "Plant-derived aphrodisiacs are generally less revolting. The Coco-de-mer may be an exception, as it has been named 'the most indecent fruit in the world' by Johan's Guide to Aphrodisiacs." None of the 959 statements scientifically confirm aphrodisiac properties in *Lodoicea*, but the word is spread and creates an artificial demand.

Coco-de-mer therefore has the threat not only of survival on two small islands, like most of the other endemic species, but also the threat of over-exploitation. Ensuring the effective and sustainable management of *Lodoicea* is a significant challenge. Normally one would look first at the population dynamics of a species but the very long life cycle of *Lodoicea* and the lack of demographic data make it impossible to wait for scientific results to safeguard this species. Consequently it is also difficult to predict the effect of conservation actions on the viability of the populations.

But in research one has to start somewhere. While collecting historical information on the size, structure, productivity and health of populations, it soon became obvious that documentation is scattered and it is extremely difficult to identify quantitative and qualitative changes of the *Lodoicea* populations. In the archived annual reports of the Agricultural Department no mention is made of any surveys and in most cases it seems that the few figures available are simply estimates. But it is interesting to note (from these admittedly incomplete reports) that the number of nuts exported between 1917 and 1957 averaged 3244 per year (minimum 1070 in 1955, maximum 5725 in 1938). The price of a nut during that time was around 1 or 2 Seychelles Rupees! Today the price of nuts varies from SR 1200 to 3000.

There are three main *Lodoicea* populations on Praslin and Curieuse and data has been collected for productivity rates per population and female trees. Interestingly there appears to be variation between the populations, not only in productivity but also in morphology. The significance of the variation is being researched. In addition a new data collection system is being designed to ensure the collection of data in all three populations. This system will also allow the management teams to assess the effectiveness of conservation actions on the viability of the populations within a manageable period.

Although both ex situ and in situ conservation have been investigated, the emphasis is on in situ conser-

vation (i.e. conservation of the natural populations). In such small areas of forest, the effects of forest fires can be devastating on such a slow growing species as *Lodoicea*, so there are certain practical conservation actions, e.g. fire prevention, that have to be taken. Planting more nuts is another. It is surprising to find that between 1894 and 1954, 7051 nuts were recorded planted in the forests of Praslin. For the same period on Mahé, 439 nuts were recorded planted. Unfortunately there are no reports of the success rate of such plantings but it shows that conservation efforts for *Lodoicea* were an issue even in the past.

Nevertheless, because of the relative lack of information on the life cycle of *Lodoicea* it is imperative that the Precautionary Principle be used, particularly until such time as monitoring data can be fed into the management and decision-making process. Adaptive management is identified as crucial, to ensure sustainable exploitation; that is, management has to integrate research results directly into the conservation strategy for *Lodoicea*. In the mean time a conservative approach has to be taken towards, for example, the number of nuts left in the forests for regeneration. In addition, the application of legislation as a tool in the conservation of *Lodoicea* has been reviewed and the current Coco-de-mer Management Decree will require updating to be effective.



Coco-de-mer kernel being dried before export to the Far East (F Dogley).

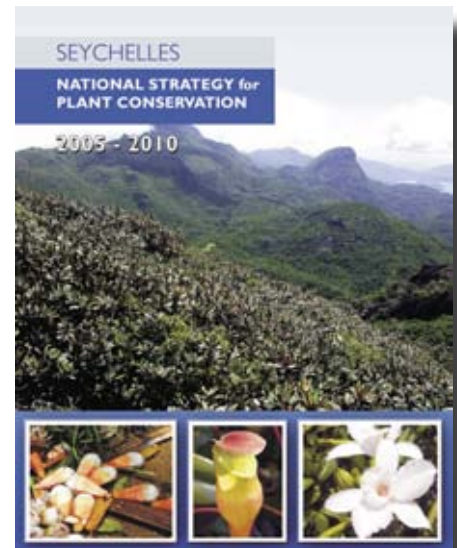
There are still many gaps in our knowledge with respect to *Lodoicea*. Research on this species should be given more priority. The focus should be on how best to obtain new information in a relatively short time, for example on its life cycle, ecology and potential in restoration of habitats, that will assist in advancing conservation management of the species. How much research can be done will to a large extent depend on the financial resources that Seychelles and other partners can provide.

Now available in published format!

Seychelles National Strategy for Plant Conservation 2005-2010

All stakeholders, organisations and experts who attended the NSPC Workshop will receive a copy of the Strategy.

- Any other local individual or organisation wanting a copy should contact James Mougat at Botanical Gardens (Phone: 670 500 or Email: boga@seychelles.net).
- Any local person or organisation requiring more than one copy must apply in writing to the Director, National Botanical Gardens, Mont Fleuri, giving reasons for the request.
- Any overseas person or organisation requiring a copy of the Strategy should apply in the first instance to one of the above contacts.



Coming soon!

Guide to Endemic Palms and Screw-pines of the Seychelles Granitic Islands

by Denis Matatiken and Didier Dogley

Published by the Plant Conservation Action group (PCA)

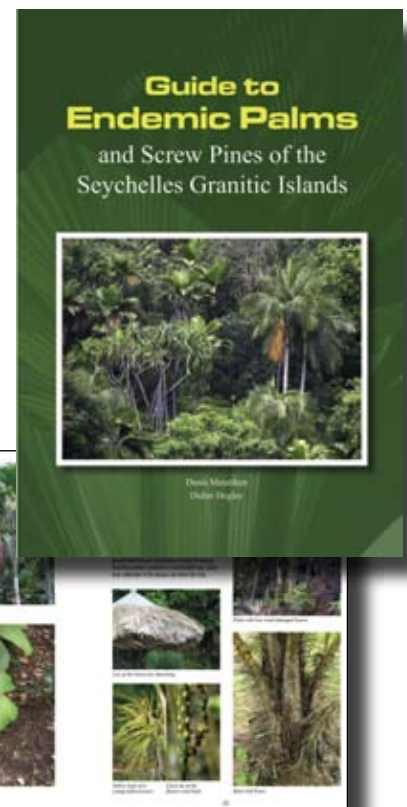
This printed guide gives you all the information and photographs you need to identify the six endemic palms and four endemic vakwa (pandans) of the granitic Seychelles. It is the first in a series of booklets to be published on the endemic and indigenous species of the Seychelles granitic islands.

The paperback will be on sale at Antigone bookshop, Victoria and other outlets at a price of SR75.

Order a copy now and get it for only SR65!
(postage and packing extra)

E-mail: boga@seychelles.net / james_mougat@yahoo.com

Phone: 670 500 and ask for James Mougat



Join PCA!

Any person interested in plant conservation in the Seychelles, either from the Seychelles or somewhere else in the world, is invited to join the Plant Conservation Action group (PCA). As a member you support plant conservation in the Seychelles, get Kapisen - the PCA newsletter - twice a year sent to you by e-Mail, and get regular invitations to events and field excursions.

For joining PCA, contact Didier Dogley (Chairman) or Denis Matatiken (Secretary) at

E-Mail: boga@seychelles.net
Phone & Fax: (+248) 266 903

