

A large, textured orange handprint is centered on a blue background with a subtle pattern of white dots. The handprint has a rough, almost crystalline texture. A green rectangular box with a thin border is superimposed over the middle of the handprint, containing the title and other text.

# **Kapisen**

**Plant Conservation Action group**

**Newsletter**

**June 2006**

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**A network of plant conservation supporters**

## Bringing more people on the Plant Conservation Boat!

On 24 February 2006 the Seychelles National Strategy for Plant Conservation (NSPC) was officially launched (p.13) in the presence of some key players, who enthusiastically signed up to helping achieve a number of the targets. This will carry plant conservation forward. However, the targets of the Strategy are ambitious and the time is short: there is little more than four years to go until 2010! To achieve these targets we need to bring as many people as possible on board. This issue of Kapisen presents some of the people that are already on the Plant Conservation Boat and welcomes many more to join.

A number of hotels have become committed to habitat restoration and plant conservation in Seychelles. These very important conservation actors, that have the possibility to send the conservation message through their costumers around the world, are represented in this issue by two examples: North Island (p.14) and Cousine Island (p.4). But also private initiatives can make a difference. In this issue we report from Moyenne Island, which PCA members recently visited (p. 14), and we will feature more examples of successful private initiatives in future issues.

Also scientific support from abroad remains strong. In this issue we introduce the researches of recent visitors from neighbouring La Réunion and far distant Estonia. Gaëlle Carpaye-Tailamee and Nila Souprayen-Cavery have monitored the distribution of the endemic orchid *Malaxis seychellarum* (p. 11), and brought for once good news: that for now this species is not threatened. Leho Tedersoo has undertaken the first in-depth study on mycorrhiza associations of specific Seychelles plants (p.5). He found that ectomycorrhizal fungi diversity is very low, and it will be interesting to see how many of these fungi are unique to the Seychelles. As with Seychelles flora, diversity may be relatively low but endemism high...

Two other articles show the importance of involving as many people as possible in plant conservation. Careless lighting of fires (p.7) and the introduction of pests such as white flies (p.12) are important threats to plants in Seychelles. So everyone, if not thoughtful, can become a threat factor for the native flora...

Of course, we want to protect plants not just from people but especially for people. As mentioned in the previous issue of Kapisen, the first Seychelles settlers

found many uses for endemic palms and pandans, particularly the Coco-de-mer palm. A fascinating exhibition of these traditional uses was recently held on Praslin assisted by craftspeople and enlivened by schoolchildren (p. 13). Other native plants that have been utilised in a variety of ways are described in the article on page 3.

Plant ecologists are becoming increasingly aware that plant diversity owes much to an underground network of myriads of tiny supporters such as mycorrhiza fungi. The survival of plant diversity will depend similarly on a broad network of small but important contributions by many human supporters! We hope therefore that in the four years to come many more people will get involved in plant conservation in Seychelles!

Katy Beaver, Christoph Kueffer & Eva Schumacher  
Editors

The electronic version of Kapisen can be ordered from [boga@seychelles.net](mailto:boga@seychelles.net) or downloaded from [www.geobot.ethz.ch/publications/books/kapisen](http://www.geobot.ethz.ch/publications/books/kapisen)



**Photo front cover:**  
fungal network around plant roots  
= support for native species!  
(L Tedersoo)

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## Traditional Uses of Native Plants

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In a previous article on traditional uses of native plants (see Kapisen 4, page 13) we mentioned the practice of thatching houses with *Latannyen fey* (*Phoenicophorium borsigianum*), the leaves being sewn with pliable string made from unfurled leaves of Coco-de-mer. But when thatching, you need something to attach the leaves to in the first place - a lattice-work of wooden bars or 'baton', and for these, woody stems of Kafe maron gran fey (*Paragenipa wrightii*) were used, creating a durable base for the thatch. People also used Bwa dir (*Canthium bibracteatum*) for this purpose but in the middle of the 20<sup>th</sup> Century it was the less common of the two species even though it grows faster. Kafe maron gran fey stems were also used to create robust and long-lasting fences around houses, shops and gardens.

A very useful tree for making rope was Var (*Hibiscus tiliaceus*), the bark of which can be stripped off the tree, and the flexible inner part utilised as string or cord. To make strong rope, for anchor ropes for example, it was necessary to braid the strips together, splicing new strips in one by one until the required length was reached. On Praslin people also used Var string to bind rolled plugs of tobacco leaves ('karot taba'), a valuable crop. This continued until at least the 1980s. On Mahé, people used Koko maron (*Curculigo sechellensis*) for this purpose and were convinced that the much darker colour of the Koko maron string produced superior tobacco (the Var string is pale in colour). Could there be some truth in this we wonder – some chemical in the Koko maron string which influenced the colour and flavour of the tobacco? In consequence, Koko maron was introduced into Praslin so that it could be used there too!

An interesting creeper which is more in evidence on Praslin than on Mahé is Zolivav (*Flagellaria indica*). Its elongated leaves, tipped with curling tendrils, are reminiscent of the foliage of the climbing ornamental Gloriosa lily. But Zolivav is a "heavy-duty" creeper, with a tough woody stem when mature. Because of its creeping habit and tough stem, some call it rattan (which is actually a spiny creeping palm), but Zolivav stems are best split into two and used like cane or split bamboo. In this form they can be woven into baskets and fish traps. In the age of coconut plantations, very large open baskets made from Zolivav were

used for collecting coconuts. Old fishermen who remember fishing way back in the early 1900s say that Zolivav fish traps were better than bamboo traps as they actually attracted the fish, so you got larger catches. Perhaps there was some sort of chemical in the Zolivav stems which acted as an attractant to the fish!



**Top photo:** Tying tobacco with string made from plaited inner bark of Var (notice: to the right of the picture are a broom made from stripped central veins of coconut leaflets and a bag woven from *Pandanus utilis* leaves).

**Bottom photo:** Close up showing the plaited Var string being tied around the tobacco leaves. (Both photos courtesy of Research Section, National Heritage)

Could a plant like Zolivav be grown sustainably and used as a "new" material for craft work? It takes up very little space as it creeps up trees but doesn't harm them, and it seems to do better than many other plants in burnt areas. There must be people who still have the skills to prepare the stems and make baskets and traps. Is there an entrepreneurial opportunity here? Other non-native plants used for similar purposes, such as Vakwa sac (*Pandanus utilis*), Bamboo (several species) and Raffia (*Raphia farinifera*), are on the decline because people are using them without sufficient replanting, leading to unsustainable exploitation. This is one of the issues to be tackled in Target 8 of the NSPC. Any takers?

## Cousine Island's Habitat Restoration Program

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Cousine, a satellite island of Praslin, covers some 26 hectares. Until 1992, Cousine's plateau was a plantation for cash crops and stocked with cattle, pigs and chickens. It also supported a large population of introduced cats. Importantly, the forests on the island's Northern hill and Southern ridge were never cleared. These areas, dominated by mature *Ficus spp.* and *Calophyllum inophyllum* with *Pisonia grandis* represented to a lesser extent, perhaps represent one of the last remaining fragments of satellite island climax ecosystems in the Seychelles.

fact to be reacting to both disturbance and the lack of competition following restoration which mainly focused on the removal of *Cocos nucifera*. We now know that *P. grandis* is a dominant coloniser, and its present distribution on Cousine, excepting the mature stands on the hills, reflects this. While we have in no way attempted to disadvantage the species, when mature *P. grandis* fall, around half are removed, and not allowed to vegetatively regenerate anywhere except on the coastal margins. The effect of this active management has allowed the growth of very heterogeneous mixed woodland of, amongst others: *Thespesia populnea*, *Hernandia nymphaeifolia*, *Cordia subcordata*, *Terminalia catappa*, *Euphorbia pyrifolia*, *Guettarda speciosa*, *Morinda citrifolia*, *Tabernaemontana coffeoides*, and *Premna serratifolia*. It is hoped that the future distribution of these species will be regulated by the natural processes of avian distribution of seeds and competition.



The vegetation at the start of the restoration and almost 10 years later. Photos were taken from the same spot (photos: Cousine Island).

When the present owner purchased Cousine in 1992, its conservation value was quickly realised and an extensive ecosystem restoration program was established and managed by ecologists. As part of Cousine's restoration program, to date over 4500 indigenous and endemic trees have been planted and the entire beach crest stabilized using plants. No historical records of species' relative abundance exist for the plateau of any satellite island of Praslin. Therefore in order to determine what to plant, as many proxy situations as possible were considered. Cousine staff visited many nearby satellite islands, as well as Praslin itself and recorded species transects along gradients from the coast to 250 m inland, equal to the maximum extent of Cousine's plateau. The one consistent factor was that *P. grandis* seemed to be over represented on Cousine, and appeared in

An ongoing program of alien species control and eradication forms a major part of the island's restoration work. These species include *Casuarina equisetifolia*, *Bambusa vulgaris*, *Cocos nucifera*, *Panicum maximum*, and *Achyranthes aspera*. With the help of international experts we have catalogued and quantified the extent and distribution of the vast majority of non-native flora on Cousine (Evans *et al.*, *in prep.*). It is noteworthy that of all the alien plants found on Cousine, very few have the potential to become truly invasive. However, strategies and protocols are strictly followed to keep this potential in check. Also no plant material except seeds is ever brought to the island.

Having established a diverse and healthy forest comprising native vegetation island-wide, we



are now looking at the propagation and planting of rarer Seychelles endemic species, including those threatened or limited in their distribution. As no historical information exists on some species' distribution, some may argue that this is unwarranted, and even unnecessary. However, experimental planting and good recording may yield managerially valuable and academically interesting results. We are already finding that certain species, for example *Intsia bijuga*, grow well and easily on Cousine, whilst others, notably *Rothmannia annae* struggle to establish. At present the reasons for this relative success and failure are unknown.

On average, no more than two people at a time have been involved in the direct implementation of this restoration program, and as the photos clearly show, this is testament to what can be achieved with determination. The images shown (see previous page) were taken almost exactly ten years apart. The first image shows a somewhat arid landscape dominated by grasses and *Ipomea* sp., with regeneration of *C. nucifera* evident at the base of the adult tree. The second on the other hand shows a living maturing forest of *Thespesia populnea*, *Hernandia nymphaeifolia*, *Ochrosia oppositifolia* and in the background *P. grandis*. These trees are now up to eight years old and approximately 5m tall.

As a result of the restoration planting program, Cousine is now, in as much as we can ever know, in a near natural condition. Given this increase in habitat quality an opportunity for the translocation of threatened species was realised, and Cousine is

now home to five Seychelles endemic species - the Seychelles Warbler, Fody, and Magpie Robin, which were all translocated to the island, and the Seychelles Blue Pigeon and Sunbird which found their way naturally. Given that the restoration and conservation program is so central to Cousine's management philosophy we are independently meeting many of the targets of the Seychelles National Strategy for Plant Conservation. Cousine meets all the sub-targets under the heading of 'Increasing Public Awareness' and is actively involved in national education and advocacy programs, via the media and with visits from representatives of government, NGOs and school groups. We are presently working with the Wildlife Clubs of Seychelles, a local NGO to enable school groups from all over Seychelles to visit Cousine. Internationally we are raising awareness through our website and through peer reviewed research publications. All the island's hotel guests go through a process of sensitisation and education, leaving with an understanding of the extreme rarity and value of island ecosystems.

Cousine's ecologists and management would also welcome the opportunity to participate at any level in the strengthening of a national network of plant conservation.

## Reference:

Evans, D.W., Dunlop, L., Hardcastle, J. and Hobro, F.E., (in prep.). The status, vectors, and management of non-native species on Cousine island, Seychelles.

## Mycorrhizas - Fungal Friends of Plant Roots

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The Seychelles granitic islands form a part of the ancient Gondwana landmass and have retained some of the vegetation that has evolved in isolation for ca 60 million years. During this period, thousands of microbe species must have coevolved with native plants or dispersed continuously from overseas. Such a biogeographic problem of microbes, in particular mycorrhizal fungi, attracted my attention when studying the diversity of soil fungi in Estonia, North Europe. Another question, related to dispersal,

was raised: How diverse are mycorrhizal fungi in Seychelles? To try to answer such questions I visited Seychelles in February/March 2006.

## What are Mycorrhizas?

Mycorrhizas are symbiotic organs that involve the outer cells of fine plant roots and specialised fungal hyphae. Despite their microscopic size, mycorrhizas facilitate nutrient uptake and communication between higher plants and microbes all over the world. In fact, it has been hypothesized that the ancestors of root symbiotic fungi enabled colonization of land by plants in the Ordovician, some 500 million years ago. Fossil evidence suggests that these fungi colonized the root-like rhizoids of lower plants. Even nowadays several species of mosses and liverworts form mycorrhiza-like structures.

## The three types of mycorrhiza

The oldest type of mycorrhiza is called **arbuscular mycorrhiza**. This type is very common and involves most living higher plants and a single phylum of fungi. In arbuscular mycorrhiza, fungi form branching bush-like structures (arbuscules) inside living root cells.

With the diversification of higher plants, other mycorrhiza types evolved - involving higher fungi, mostly ascomycetes (sac- or cup-fungi) that form hyphal coils inside plant root cells. These are more efficient at nutrient uptake. One type is **ericoid mycorrhiza**, which is widespread in most species of Ericaceae (e.g. Erica, Rhododendron).

**Ectomycorrhizas** are less common, found especially in temperate forests of the northern hemisphere but also in phosphorus-poor soils of the tropics. Ectomycorrhizas are sometimes called sheathing mycorrhizas because they consist of a fungal mantle or sheath, from which fungal hyphae penetrate outwards into the soil (see photo) and inwards between the cells of the plant root.



Ectomycorrhizas of *Vateriopsis seychellarum* and an unidentified fungus. L'Abondance, Mahé (L Tedersoo).

Most tropical plant communities are highly diverse and form arbuscular mycorrhiza. In contrast, there are monodominant stands of two ectomycorrhizal families, Dipterocarpaceae and Caesalpinaceae, in the rainforests and savannas of Madagascar, Continental Africa and South America. Probably the ectomycorrhizal fungi of these monodominant trees modify soil conditions by inhibiting litter decomposition and thus create favourable conditions for the establishment of host tree seedlings (positive feedback). Dipterocarp seedlings survive better in the rooting zone of parent trees, relying on abundant fungal inoculum.

However, in contrast to the low diversity of fungal symbionts in arbuscular mycorrhizas and ericoid mycorrhizas, ectomycorrhizal fungi comprise 7 000-10 000 species worldwide. These species have independently developed from nonmycorrhizal

ancestors and may, therefore, display a high diversity in function as well. Fungal diversity *per se* is likely to be important in 1) maintaining the long-term stability of the symbiosis and 2) providing a buffer against environmental fluctuation.

## How mycorrhizas help plants

Mycorrhizal fungi are far more effective than plant roots in taking up several soil elements. Due to their small diameter, (2 to 12 µm), hyphae can penetrate the tiniest spaces between soil particles. It has been estimated that a single gram of soil contains up to a few kilometres of hyphae. This in turn considerably increases the contact area between plant roots and soil, which is important in the uptake of many dissolved nutrients. In addition, mycorrhizal fungi protect host plants from water stress by regulating water uptake and storage. They can also help to protect the plant against micro-pests and diseases, and the harmful effects of heavy metals.



Fruit-bodies of an ectomycorrhizal *Boletus* sp. in *Intsia bijuga* – Coco-de-mer forest, Vallée de Mai, Praslin (L Tedersoo).

## Seychelles mycorrhizas

Most of Seychelles' plants probably form arbuscular mycorrhizas – based on published notes on mycorrhizal status of related species or genera elsewhere in tropics. A few native tree species, *Vateriopsis seychellarum*, *Intsia bijuga* and *Pisonia grandis*, are ectomycorrhizal with presumably indigenous fungi. Mycorrhizas of *Pisonia grandis* have been previously studied in Bird and Cousin islands, revealing only two species of fungi that were identified as belonging to basidiomycetes (Ashford

& Allaway, 1985). Elsewhere *Pisonia grandis* and other members of Nyctaginaceae are known to be associated with just a few species of fungi, which is quite exceptional among autotrophic plants. Interestingly, the three host plant species formed mycorrhizas with as few as 26 fungal species in several stands in Mahé, Praslin and Cousin. This is in a striking contrast to boreal forests of the Northern Hemisphere and dipterocarp forests of India and Southeast Asia that support several hundred fungal species per hectare. Such a difference can be attributed to isolation and small size of Seychelles islands and particularly to the rarity of host trees. None of the fungal species could be proved identical to European, African or Asian species, but this is likely due to lack of similar studies in the latter two areas.

Some of the introduced trees – *Pinus caribbea* and eucalypts also form ectomycorrhiza. Eucalypts in Seychelles have likely obtained their symbionts from native species, but seemingly all the fungal partners

of pine have made a journey together with their hosts from Europe. These hitch-hiking fungi pose a potential threat to native ecosystems. In other tropical countries some fungi have invaded native communities or substantially depleted soil resources. In addition, fruit bodies of several introduced fungi are toxic.

I thank Katy Beaver, James Mougall and Didier Dogley for help.

**Photo front cover:** Dichotomously branched ectomycorrhizas of the introduced *Pinus caribbea* and a co-introduced unidentified fungus. Le Niol, Mahé (L Tedersoo).

## References:

**Ashford AE, Allaway WG. 1985.** Transfer cells and Hartig net in the root epidermis of the sheathing mycorrhiza of *Pisonia grandis* from Seychelles. New Phytologist 100: 595-612.

## Forest Fires on Praslin

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Since the arrival of the first settlers over 200 years ago, the main granitic islands of the Seychelles have experienced frequent forest fires probably originating from human activities. The islands of Praslin and Curieuse have been particularly susceptible. However, even before Seychelles was settled, Lamperaire, the commander of a French expedition ship visiting Praslin in 1768, recorded that the island showed signs of damage caused by extensive forest fires. He even noted that the rocks showed clear indications that they had been exposed to extreme heat. This article presents a number of explanations that have been put forward to explain these past fires and considers the susceptibility of the two islands to fire at the present time.

Two main explanations have been advanced for the early fires. A first hypothesis suggests that sailors burned the Coco-de-mer (*Lodoicea maldivica*) forests after collecting shiploads of nuts so as to keep prices of the nuts high by preventing others from finding the source. For many years it had been thought that Coco-de-mer originated from beneath the sea and, because there were few nuts available, rich and

influential persons were prepared to pay large sums of money for one.

The other possibility is that fires were started by natural causes. Here again two main possibilities have been put forward – one is lightening and the other is quartz, large crystals of which are found everywhere on the island and could possibly focus the sun's rays onto dry plant material, starting a fire. However, no-one is known to have investigated the focussing properties of quartz crystals in Seychelles. Lightening strikes on trees are relatively high in certain regions of the tropics. In the Singapore Botanic Garden alone, for example, lightening strike killed over 100 trees between 1990 and 2004, at a rate of 2 to 10 trees per year. There is, however, a counter argument – that lightening in Seychelles is closely linked to thunderstorms, which principally form during the first quarter of the year or the wet season. Occasionally thunderstorms and lightening do occur during the dry season but in combination with rain and therefore the probability of any forest fire is low.

In general, there are three main factors necessary for forest fire to take place – continuous fuel availability, an ignition source and low microclimatic humidity. Additionally, wind and topography can influence the intensity and spread of fire. In native forests of the granitic islands, fuel load is normally abundant. Ignition sources are also abundant on the inhabited granitic islands, with anthropologic burning activities



probably the main ignition source. The number of burning permits issued annually ranges from 700-1200 permits on Praslin and comparably on Mahé. On Curieuse, in contrast, which suffered greatly from fires in the past, there has been no forest fire since 1967. This has been attributed to the absence of a significant permanent settlement on the island. It also supports the argument that human burning activities are a major contributing factor to the occurrence of fire on the granitic islands of Seychelles. Climate is assumed to be the determining factor for the more frequent occurrence of fire on Praslin compared to Mahé, because mean annual rainfall on Praslin is only about half that on Mahé.



After a forest fire at Fond Ferdinand (L Chong-Seng).

The degradation caused by forest fires, in combination with soil erosion, is especially visible on Praslin and Curieuse islands. On average, there are 5 bush fires per year that the fire department has to deal with. Records show that the size of burnt areas has ranged from a couple of hundred metres to hundreds of hectares. Because forest fires occur principally on hillsides, this has led to the loss of productive forests, a significant increase in degraded land and a decrease of surface water and soil fertility on the two islands. Such degraded land is comparable to a semi-arid landscape. In some areas forest fires have created gaps for invasive species to colonise land that before was covered with native plants.

The problem of fire on Praslin is a continuing one, both for nature conservation (particularly Coco-de-mer forest) and as a threat to housing and tourism. There is still much that remains to be understood about fires and their effects on the island. We need, for example, to better understand the human and climatic risk factors. Current precautionary measures – fire breaks for example – need to be evaluated to see whether they are the most appropriate means to reduce the risks of forest fire. There is much potential for research.

## Structure des populations d'une orchidée endémique des Seychelles : *Malaxis seychellarum*

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La perte d'espèces végétales affaiblit les écosystèmes et leur capacité à s'adapter au changement, et diminue la beauté et la diversité de la nature. L'archipel des Seychelles ne fait pas exception à la fragilité des écosystèmes insulaires. La flore est affectée par un grand nombre d'espèces introduites ainsi que l'insuffisance d'espace disponible et des piétinements des touristes. Sur Mahé, le massif du Morne Seychellois et du Mont Sébert-Planneau constituent les plus importants

réservoirs de biodiversité végétale des Seychelles. Notre étude a été centrée sur une espèce d'orchidée endémique des Seychelles : *Malaxis seychellarum* qui est classée par l'IUCN comme à faible risque d'extinction mais il existe peu d'information sur la biologie et l'écologie de ses populations. Cette étude présente donc deux intérêts, d'une part apporter des connaissances supplémentaires sur une espèce protégée et d'autre part, déterminer l'état actuel des populations.

### Description de l'espèce

*Malaxis seychellarum* est une orchidée endémique des Seychelles. Elle est protégée dans le Parc National du Morne Seychellois. Cette orchidée, de 15-50 cm de hauteur, a un mode de vie terrestre ou épiphyte. La tige est bulbeuse à la base avec 3-4 feuilles. La hampe florale des adultes est composée, de la base à la pointe, de bractées, de fruits, de fleurs et de boutons. Les fleurs sont de couleurs jaunes ou violacées de 4 mm de large. Elles sont fécondées par pollinisation et vont donner des fruits





**Fig. 1** *Malaxis seychellarum* (adulte) (J Mougat).

en forme de capsule. A maturation, ils vont s'ouvrir et libérer les graines. La chute de ces fruits laisse une cicatrice accompagnée d'une bractée. Pour germer, les graines doivent rencontrer un champignon.

## Méthode de relevés

Notre étude a été menée sur Mahé (144 km<sup>2</sup>), notamment dans le Parc National du Morne Seychellois. Ce Parc, créé en 1979, couvre une surface totale de 3045 hectares. Nous avons travaillé sur 12 sites. Dix d'entre eux se situaient à l'intérieur du Parc National du Morne Seychellois (Copolia, Trois Frères, Casse Dent, Congo Rouge, Morne Blanc, Mont Jasmin, Morne Seychellois, Mare aux Cochons, Mission Lodge et Mont Coton) et deux situés vers le sud de Mahé (La Réserve et Montagne Planneau).

Ces sites ont été explorés avec la mise en place, lorsque le terrain le permettait et avec un nombre suffisant d'individus ( $n > 10$ ), de transect de 30 m subdivisés en quadrat de 4 m x 5 m. Plusieurs paramètres d'études ont été pris en compte dont le

recensement ainsi que la répartition géographique, obtenue par la prise des coordonnées GPS. Nous avons également mesuré tous les paramètres nous permettant de définir la structure des populations de *Malaxis*, à savoir, la mode de vie (terrestre, épiphyte ou saxicole), l'âge (plantule ou adulte), l'état physiologique (nombre de boutons, de fleurs, de fruits et de bractées) et enfin la taille en mesurant la plus grande feuille qui est une partie représentative de la croissance de la plante et facilement mesurable.

## Résultats

*Malaxis seychellarum* a été observée sur 10 sites parmi les 12 observés. Mais elle a été dénombrée et mesurée sur 9 sites avec un total de 2836 individus. Aucun *Malaxis* n'a été observé à Mont Coton, aucun non plus à Mission Lodge et enfin, seul des points GPS ont été relevés à Mare aux Cochons car les individus s'observaient occasionnellement (tableau 1).

De plus, un test de répartition nous a permis de dire que l'espèce est localement abondante avec un comportement grégaire. Ce type de répartition laisse à penser que les individus sont regroupés dans les endroits les plus favorables.

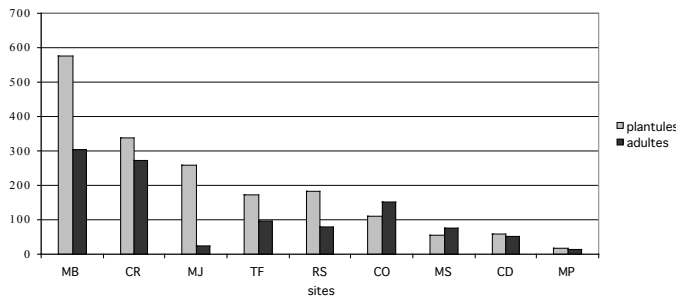
**Tab. 1** tableau récapitulatif des effectifs observés au sein des 12 populations de *Malaxis seychellarum* sur l'île de Mahé. \* : site en dehors du Parc National du Morne Seychellois

Nom Site	Code Site	Nombre Total d'individus	Date Prospection
Copolia	CO	261	27/12/05
Mare aux Cochons	MC	-	29/12/05
Mission Lodge	ML	-	05/01/06
La Réserve *	RS	260	11/01/06
Trois Frères	TF	269	12/01/06
Casse-Dent	CD	111	13/01/06
Mont Coton	MCt	-	16/01/06
Congo Rouge	CR	612	18/01/06
Morne Blanc	MB	881	19/01/06
Mont Jasmin	MJ	281	23/01/06
Morne Seychellois	MS	131	24/01/06
Montagne Planneau *	MP	30	25/01/06
total	12	2836	



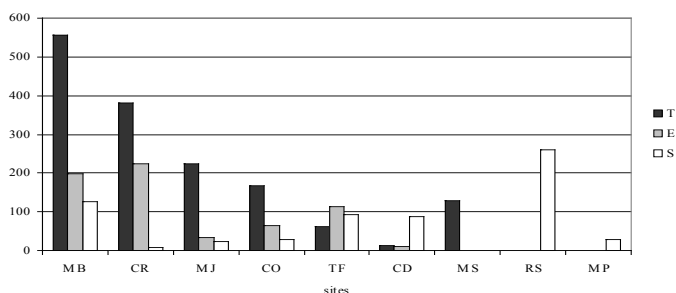
**Fig. 2** *Malaxis seychellarum* au stade fleur et fruit (J Mougat).

Le nombre total de plantules ( $n = 1765$ ) est supérieur au nombre total d'adultes ( $n = 1071$ ). Ce qui laisse penser que, sur Mahé, *Malaxis seychellarum* n'a pas de problème de régénération. Cependant, Copolia et Morne Seychellois semblent avoir un problème au niveau du recrutement. De plus, la taille des adultes et des plantules diffère selon les lieux. En effet, nous constatons que Trois Frères et Mont Jasmin ont les plus petits adultes et Casse Dent et Morne Seychellois les plus grandes plantules (figure 3).



**Fig. 3** Distribution du nombre d'individus par classe d'âge par sites d'étude.

Concernant le mode de vie, le nombre important d'individus terrestres ( $n=1537$ ) laisse à penser que l'espèce a une préférence pour ce mode de vie. Cependant, une forte compétitivité au sol ou une végétation dense amènerait l'espèce à une stratégie de mode de vie épiphyte ou saxicole (figure 4).



**Fig. 4** Distribution des individus selon leur mode de vie pour chaque site étudié ; T : terrestres, E : épiphytes, S : saxicoles

Bien que les champignons nécessaires à leur développement se trouvent aussi présents dans la mousse des arbres et des rochers, les ressources nutritives sont plus restreintes que dans l'humus du sol. Cette restriction nutritive semble se traduire sur la taille des individus. En effet, les terrestres sont en général plus grands que les épiphytes et les saxicoles. Donc, en étant épiphyte ou saxicole, la plante va orienter son énergie dans sa survie plutôt que dans sa grandeur.

Enfin, tous les individus adultes présentaient des boutons et/ou des fleurs et/ou des fruits. Toutes ces populations investissent dans leur reproduction. Cependant, le taux de fécondité est faible pour Morne Seychellois, Casse Dent, Congo Rouge et La Réserve ; moyen pour Morne Blanc, Montagne Planneau, Trois Frères et Mont Jasmin ; et enfin, fort pour Copolia.

## Tests statistiques

D'après les tests de corrélation de Spearman, nous pouvons dire que l'altitude a une influence sur la taille des individus ; la taille et l'altitude influencent le nombre total de fleurs par inflorescences. Enfin, d'après les tests ANOVA et Kruskal-Wallis, nous pouvons dire qu'entre les populations, l'âge et le mode de vie influencent la taille des individus ; le mode de vie influence la fécondité chez les Terrestres et les Epiphytes. De plus, à l'intérieur des populations, nous pouvons dire que l'âge et le mode de vie influencent également la taille des individus mais le mode de vie n'influence pas la fécondité. C'est donc le milieu qui influence tous ces paramètres.

## Conclusion

Notre étude nous a permis, dans un premier temps, d'obtenir des informations sur *Malaxis seychellarum*. L'espèce se localise dans des forêts humides de plus de 400 mètres d'altitudes. Elle se développe dans les sous-bois, dans les zones humides et à faible luminosité. Elle a un comportement grégaire et son mode de vie est principalement terrestre. Mais elle a des stratégies épiphytes et saxicoles pour s'adapter à son milieu. Dans un deuxième temps, nous avons pu définir l'état actuel de l'espèce sur Mahé. *Malaxis seychellarum* est assez fréquente à l'échelle de Mahé, ce qui confirme son statut IUCN de plante à faible risque d'extinction.

Si des modifications de l'environnement affectent les facteurs nécessaires à sa prolifération, celle-ci réagira différemment selon l'ampleur de la variation. Dans les forêts denses des Seychelles, les incendies et les invasions des pestes végétales sont à surveiller. En effet, dans le premier cas, l'espèce aura du mal à reprendre le dessus sur un milieu asséché et découvert par le feu. Dans le deuxième cas, les populations de *Malaxis seychellarum* risqueraient de décroître car le milieu serait trop dense et touffu. Mais elle pourrait survivre grâce à ses stratégies de mode de vie. Bien que l'espèce ne soit pas en danger, il serait intéressant d'explorer d'autres



domaines tel que, sa pollinisation, mieux définir ses périodes de floraison et de fructification. Mais également approfondir l'étude de sa reproduction sur du long terme.

## Remerciements

Le Ministère de l'Environnement des Seychelles, Le Conseil Régional et l'A.N.T de la Réunion, Monsieur Basil Esther, Monsieur Didier Dogley, Monsieur Remie Selby, Monsieur Walter Mangroo, Monsieur James Mougall, Madame Elvina Payet, Monsieur Francis Coeur de Lion, Monsieur Doudee, Monsieur Thierry Paillet et toute l'équipe du jardin botanique

## Notes from the Field

There seem to be new threats appearing in Seychelles forests on a far too regular basis. Two pest and disease threats have manifested in recent months and an older one is continuing its devastation. And there is possibly another invasive species crisis developing on Praslin.

### Plant diseases

**Didier Dogley** reports that forestry officers at the Forestry Station at Le Niol, on Mahé, have discovered several dead Bwa zoliker (*Pittosporum senacia subsp. wrightii*) in the vicinity. Samples have been sent to La Reunion to see if the disease can be identified. And **Lindsay Chong-Seng** reports a further scare resulting from the death of several Coco-de-mer palms from some unknown cause on Praslin. Again there will be follow up to try to discover the cause of death.

It is with regret that **Katy Beaver** reports the demise of two of the three large Sandragon trees near the top of Morne Blanc. Having finally succumbed to Sandragon Wilt disease, the trees are now infested with wood-boring beetles. Impacts on the epiphytes such as mosses and ferns will continue to be monitored (see Kapisen 1, page 6). The largest of the three trees still survives but epiphytes on many parts of the tree show signs of continuing stress, extreme in some cases, as is shown in the photos. Once the decline sets in, even if there is slight recovery during the rainy season, the loss of epiphytes continues. The reduction in available old-growth habitat is just as serious for rare epiphytes as for flowering plants.



Monitoring quadrat in October 2003 with healthy epiphytes (K Beaver)



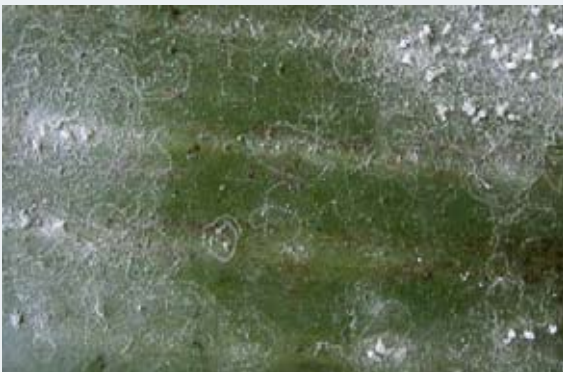
Same monitoring quadrat in March 2006 with few epiphytes surviving (K Beaver)

## Another awful invasive?

A long time ago **Willy Andre** noted that *Albizia* became a real problem on Praslin only after fires destroyed large areas of vegetation. Some two years ago, **Christoph Kueffer** noticed active regeneration of *Acacia mangium* on the same island and was concerned. Now that he has done a literature research on traits of invasive species that may make them particularly invasive on very nutrient-poor soils (such as are found on Praslin), he finds that *Acacia mangium* has them all! So will this species become as bad as *Albizia* in the future? Although these two species (and also *Prin-d-frans*) do help to cover the soil and reduce erosion on Praslin, they unfortunately create very serious problems for the growth of our native plants.

## Spiralling whiteflies

**James Moug** on a recent trip to Silhouette observed spiralling whiteflies on a native fern (*Nephrolepis biserrata*) at the beginning of the track going up to the population of *Impatiens gordonii* in Anse Mondon Valley. There is no record of the presence of whiteflies on this species in the wild, but based on his personal observations while growing cuttings of *I. gordonii* for the reintroduction project in the Biodiversity Nursery, we could be facing another major threat to the survival of this species. Though whiteflies didn't appear to kill these nursery plants, they had a significant impact on the plants' health, growth and development. Considering that Silhouette has some of Seychelles rarest herbaceous species, this situation should be closely monitored.



Spiralling whiteflies on banana leaves (K Beaver).

On Mahé the spiralling whitefly problem has already taken its toll. **Christoph Kueffer** observed more than a year ago that juveniles of plants such as *Bwa merl* died in Mare aux Cochons after attack by this pest. Very recently **Denis Matatiken**, who returned to Mahé from UK to do some field work for his MSc studies, has seen whiteflies on trees of the rare Jellyfish tree (*Medusagyne oppositifolia*).

## Green line telephone

These are sad stories, but field observations are important and should be acted upon straight away to prevent the situation from worsening.

**If you see anything of this kind, please report it to the Department of Environment**

**Green line telephone: 722111.**

## Better news!

To cheer readers a little, news on the fungal front is happier. The rains of March and April brought forth some wonderful fungi to photograph (see also page 6). Here are two of them – one that looks like a terrestrial coral and the other fringed with an attractive lacy skirt.



Coral fungus (K Beaver).



Beautiful but smelly! – a stink horn fungus (K Beaver).



## PCA and NSPC News

One joyful piece of news is that TWO PCA members, **Christoph Kueffer**, of ETH Zurich, and **Frauke Fleischer-Dogley** have achieved the title of Doctor. Christoph spent several years carrying out research in Seychelles, before returning to Switzerland to write up his work, and is now absorbed into a life of university lecturing. Happily he remains in touch with Seychelles, continues to provide PCA with support and information and helps to edit this newsletter! Our locally very active PCA member, Frauke, worked on her doctoral thesis on a part-time basis as she has a family as well as a full-time job. Her work will increase our understanding of Coco-de-mer populations and their management. Congratulations to them both!

Another major achievement for PCA has been the publishing of the first of a series of colourful booklets on the endemic plants of Seychelles – “**Guide to Endemic Palms and Screw Pines of the Seychelles Granitic Islands**”, by Denis Matatiken and Didier Dogley, and to which many members of PCA contributed in one way or another. This booklet is now available locally at a number of outlets (see page 16) and also PCA is arranging to have it distributed internationally by a UK book supplier. The next in the series will be on the endemic herbaceous species, including orchids. These publications contribute towards NSPC Targets 1e and 10.

A recent PCA field trip took us to **Moyenne island** (see p. 14). This visit gave us an insight into what one person, with a love of plants and a vision, can achieve over a number of years. The rehabilitation of Moyenne Island was not planned as an environmental project per se, but more as a way of clearing what the owner, Brendon Grimshaw, says had been “wild bush” and turning it into a “wild park easily accessible to visitors of all ages and providing a glimpse of most of the vegetation to be found in Seychelles, especially the endemic palms and trees”. In recent years, by establishing as many endemic plants as possible, he has gone a long way towards establishing a more natural vegetation on the island, and has in effect been fulfilling several of the Target areas of NSPC for some time!

The official launching of the **National Strategy for Plant Conservation NSPC** was held on 24 February in the presence of the Minister for Environment and Natural Resources. It was an occasion for representatives of different government bodies, embassies, the private sector (see page 4 and 14) and environmental NGOs to make commitments towards fulfilling specific target areas of the Strategy. We are happy to say that there is now a solid base for moving forward in a number of Targets, particularly 1, 3, 7 and 9. (Photo: Seychelles Nation newspaper)



Fulfilling a vision is also what is happening slowly at the **Biodiversity Centre at Barbarons**, on Mahé. On Earth Day an exciting event was held there to increase awareness of the ongoing developments in ex-situ plant conservation. Department of Environment staff and school children had the chance to observe: all six Seychelles endemic palms growing in a new ‘palm forest’; a specially developed area of native plants that will attract native birds; some of the many native plants that are now being grown ex-situ; and a newly developed area of Aldabra species. Many trees and shrubs were planted and everyone was challenged to answer questions on an activity sheet, which required good field observation. For refreshment, freshly pressed juices, local herbal teas (‘refresisan’) and local snacks were served. Isn’t this a good way to learn about plants? And at the same time it helps to fulfil Targets 10 and 11 of the NSPC.

Another recent “awareness” activity about plants was a **Coco-de-mer exhibition held on Praslin** at the Community Centre at Grand’Anse and at Vallée de Mai, by Seychelles Islands Foundation (SIF). Focussing on traditional uses of the Coco-de-mer palm, there were examples of woven articles, in particular hats of all kinds, including some old styles that haven’t been seen for years, and made using methods that are in danger of being forgotten. Students enjoyed modelling these hats! Another highlight was a model house made from Coco-de-mer, together with utensils made from the nuts. Also a display of the wide range of sizes and shapes of individual nuts. This exhibition will be brought to Mahé later in the year. (Photo: L Chong-Seng)



SIF also now has a **digital herbarium for Aldabra plants**, in use on the atoll by SIF staff. This is thanks to the hard work and dedication of a former Aldabra Research Officer, Rainer von Brandis. It is hoped that this ‘first’ for Seychelles will later be made more widely available, and thus contribute to NSPC Target 1.

## PCA Welcomed to Moyenne Island

On the 1st of April a field visit to Moyenne Island was organised for PCA members. Our small group was ferried across to the island on board an MPA boat. On arrival we were greeted by Mr Brendon Grimshaw the owner. He was a very good host, putting us all at ease with his jokes until we were ready to tour the island. As we proceeded along the path, different plants were sighted such as the six endemic palms, bois de natte, bois banane, bois calou and many more. Even a large number of giant land tortoises were seen roaming around and few species of land birds were spotted too.

Mr Brendon's vision to continue establishing more plants, especially the endemic ones, will truly turn the island into a sort of plant haven. Moyenne Island is a marvellous place to visit for any plant enthusiast. All in all it was a fruitful experience and I would recommend a trip to the island for any visitor or nature lover.

*Alex Underwood, PCA member*



Brendon Grimshaw explaining the natural history of Moyenne Island to some members of PCA (L Chong-Seng).

## Extracts from a Statement read out at the Launch of the NSPC on behalf of North Island

North Island's Vision includes a strong, long-term commitment towards the conservation and restoration of the island's precious natural environment.

By becoming part of the FFEM-funded project, North Island joined hands with the Ministry of Environment & Natural Resources, the Island Conservation Society who coordinates the project, and the Plant Conservation Action group to form sustainable relationships towards the rehabilitation of Seychelles' islands ecosystems.

Over the past 12 months, PCA has become one of our most substantial partners. Immediate benefits from the cooperation with PCA and their partner, the Geobotanical Institute in Switzerland, are:

1. the improvement and further development of our vegetation rehabilitation scheme;
2. the development of a monitoring methodology as an essential component of the rehabilitation.

So far, we are proud to report that between 15 - 20 % of the total surface of the island has already benefiting from a degree of rehabilitation over the last 5 years. In the last 6 months we have intensely rehabilitated about 3% of the island and planted out approximately 1400 endemic species from our nursery under the guidance of PCA. NI has committed to rehabilitating to some degree a total surface of 60 ha & planting 20 000 endemic plants by end 2009.

With these efforts, NI is already making a substantial contribution towards the implementation of the Seychelles National Strategy for Plant Conservation. Rehabilitation protocols will be developed, therewith meeting sub-target 3c and ultimately assisting in the rehabilitation of other small granitic island via the sharing of our experiences. The partnerships forged clearly support target 13 of the National Strategy.

We are confident that we will be able to expand our support to other targets in due course, and therewith further increase our contribution to the Government's efforts to preserve the precious biodiversity of the Seychelles for its future generations.

*Bruce Simpson, General Manager, North Island.*



## Recent literature relevant to Seychelles' plant life and conservation

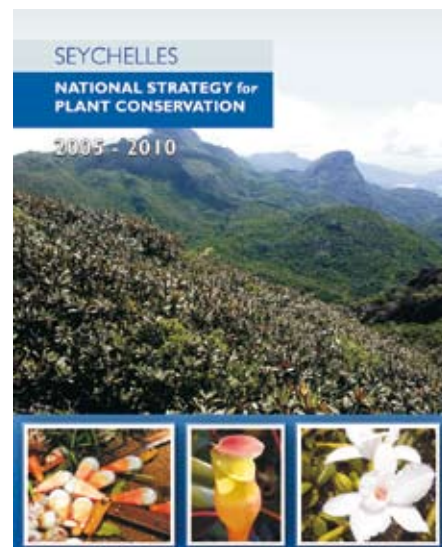
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## Now available!

### Seychelles National Strategy for Plant Conservation 2005-2010

All stakeholders, organisations and experts who attended the NSPC Workshop should have received 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](mailto: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.



## Now available!

### 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 (pandanus) 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 is on sale at Antigone bookshop, Victoria and Vallee de Mai shop, Praslin and other outlets at a price of SR75.

Overseas orders: apply in the first instance to the contact below pending confirmation of overseas distribution.

E-mail: [boga@seychelles.net](mailto:boga@seychelles.net) / [james\\_mougat@yahoo.com](mailto: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](mailto:boga@seychelles.net)  
Phone & Fax: (+248) 266 903

