



# samara

The International Newsletter of the Partners of the Millennium Seed Bank Project

## Conformity and coherence with Madagascar national strategies

### The Silo National des Graines Forestières (SNGF) and the Millennium Seed Bank Project (MSBP)

The partnership between the SNGF and the MSBP was signed in September 2000, following several months of work on the content and legal protocols of the agreement between the two institutes. The SNGF-MSBP partnership in Madagascar covers the arid and semi-arid areas of the meridional region. This region is inhabited by highly endemic species, among which are species producing orthodox seeds, able to withstand desiccation and subsequent long-term storage – good news for the conservation of these endemic species.

Such a storage option is also suitable for the long-term conservation of threatened and vulnerable species of this region. In the fourth year of the first phase (2000-2005) of this project, there is a need to evaluate critically the coherence and development of the partnership and how the SNGF should be prepared to discuss the second phase, particularly in relation to the national strategies of sustainable management of Madagascar forest genetic resources.



Madagascar



Above: *Combretum*,  
Ste Luce  
Left: *Spiny Forest* –  
*Euphorbia*



### Scientific strengths of the project

The partnership with the MSBP has enabled the SNGF to acquire knowledge and experience in dealing with:

- The flora of Madagascar (through the collection of seed samples and herbarium vouchers of more than 300 species) and the taxonomy and botany of these species
- the biology and physiology of seeds of many of these species
- the level of threat faced by some of these species in relation to their relative remaining number and distribution in forests

Moreover, the support provided by the MSBP has contributed to the improvement in skills of the SNGF staff, for example, by participation in the *Seed Conservation: Turning Science into Practice* conference in July 2001 at

Wakehurst Place, by the training of SNGF scientists in seed processing and banking and seed bank data management, and in studies of seed physiology.

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## Innovative methods of work

Since 2002, the two partners have worked on targeted, threatened species for the *ex situ* long-term conservation of their seeds. To achieve efficient seed collection, all existing information in the literature and in the databases has been reviewed and the species habitats sampled and visited. For the coming year, more attention will focus on succulent species, which have so far been overlooked.

## The Project and national strategies

The Madagascar National Strategic Plan (NSP) for the Management of Phylogenetic Forestry Resources was established in January 2000. It is based on the National Policy for the Environment, the Forestry Policy, the National Strategy for Sustainable Management of Biodiversity and the application of the OECD system to reproductive forestry materials. One of the SNGF missions is to promote this National Strategic Plan, particularly the co-ordination of managerial actions relating to the conservation and the extension of Phylogenetic Forestry Resources.

Currently, SNGF *ex situ* seed conservation conforms to the prescriptions established by the National Strategic Plan. However, some additional activities must be considered in the next phase, after 2005, in order both to improve the partnership and to comply more with the NSP. For example, to insure better coherence between the project and the National Strategic Plan, the reintroduction of forest genetic resources and the establishment of forest seed orchards should be considered; such schemes would increase the conservation and regeneration potential of species.

In conclusion, the partnership between the MSBP and SNGF should be more orientated to contributing to the National Strategic Plan for sustainable management of the phylogenetic forest resources of Madagascar.

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# Seed conservation research on the splendid palm *Ravenea rivularis*

The palm tree *Ravenea rivularis* is one of the most important palms, known for its aesthetic and ornamental properties. This endemic species is exported from Madagascar, mainly in seed form, creating an opportunity to increase farmers' incomes. The seeds are used mainly for plant production but they may also be used for extraction of essential oils. Thus, it is important to increase our knowledge of the biology of *R. rivularis* seeds, for both the development and conservation of this species.

To better understand the physiology of *Ravenea rivularis* seeds, Guy Rakotondranony recently spent two months (March-April 2003) at RBG Kew's Wellcome Trust Millennium Building (WTMB), Wakehurst Place, working on this species, as part of the collaboration between the Silo National des Graines Forestières (SNGF), Madagascar, and the MSBP.

These seed investigations completed the research activities for his doctoral thesis on *R. rivularis*.

During his fruitful visit, Guy had access to the scientists as well as to the sophisticated equipment in the WTMB seed laboratory and the resources in the library, all facilities difficult to access in Madagascar. During the course of his work, he tested the germination of *R. rivularis* seeds in different controlled conditions (such as light vs dark and different temperatures). He also



studied the effects of controlled drying and moisture content on the germination of the seeds. This information is also of relevance to the MSBP's Semina Palmarum initiative.

Guy has been able to use the data he gathered during his stay in the writing up of his PhD thesis, under the supervision of John Dransfield, of the Palm Section of RBG Kew's Herbarium, and Moctar Sacandé, of the Seed Conservation Department at the WTMB.

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Left: *Ravenea rivularis*' natural environment  
Above: In more detail

PHOTOGRAPHS: HENK BEENTJE



Left and below far left: During the same season, places within a few kilometres from each other can have vastly different degrees of vegetation development.

Namibia is lucky in that it has two different rainfall regimes, namely summer rainfall for most of the country and winter rainfall in the south-western corner of the country and therefore also two collecting seasons per year. The majority of seed is mature around April to June in the largest part of the country and during September to November in the winter rainfall area. Most priority species occur in the winter rainfall area (see map below left). However, the unreliable and irregular weather patterns in the country create some problems for the collecting team. The vegetation is very dependent on the seasonal rains and collecting missions cannot be planned until the last minute, once rainfall figures become available (if it rains at all). Getting such figures and even more general information on the development of the vegetation from remote areas has proven to be quite a task. Weather stations just do not exist in remote areas and rainfall can vary tremendously over a mere kilometre. Non-plant-minded people, who can be contacted in such areas, don't see vegetation the way a botanist does and can unintentionally supply misleading information.

Distances to travel are great and transport costly. This, combined with the shattering property of seeds of wild species, makes it absolutely essential to get the time of collecting right. This is the biggest problem for the NPGRC at the moment and an attempt will be made through this project to get nearer to a solution using remote sensing data and GIS. Initial discussions have started and it is now up to the NPGRC to select the target species that are to be used in developing an algorithm to try and predict time of seed maturity and target areas. Initially herbarium data will be used to develop the system, which will subsequently be tested in the field.

Under the MSBP, the NPGRC has acquired five deep freezers for seed storage and employed some part-time staff during the high-



Collecting *Colophospermum* seeds

season for collecting and seed cleaning. It will also utilise temporary staff for data extraction from the herbarium for the GIS project.

Thus far, collaboration in the MSBP has been beneficial for the NPGRC and the country. Unforeseen staff changes have led to targets being missed, but all efforts will be made to meet them in future.

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# A selection of international programme activities

## USA

The Seeds of Success programme continues to gather momentum with the addition of new project partners and the establishment of five Student Conservation Association collecting teams. Based at Bureau of Land Management (BLM) offices in Colorado, Oregon, Nevada, Utah, and California, the teams are making valuable collections with guidance from BLM botanists and frequent feedback from seed bank staff at RBG Kew.

In Texas, the Lady Bird Johnson Wildflower Center has been awarded a grant of \$37,150 for seed collecting from the Edwards Plateau in 2003-04 and a collector has been appointed to work with private landowners.

Chicago Botanic Garden signed a project agreement with RBG Kew in April 2003 and staff are now contacting

landowners and volunteer organisations in Illinois to invite participation in the Prairie flora collecting programme.

Discussions are advancing with the directors of the Virginia Native Plant Society about a local seed conservation program, and RBG Kew will attend the Blue Ridge Native Plant Conference in October to explore this further.

The Vital Seeds from Southern California project, funded with a grant from the Wm C Bannerman Foundation, continues to amass valuable collections in its second field season and San Diego Zoological Society have expressed interest in conserving seed from the endangered habitats of San Diego County. To further this, they have sent their Botanical Conservation Associate to participate in the Plant Conservation Techniques course held by RBG Kew.

Top: *Senecio longilobus*  
Middle: *Agave parryi* var. *huachucensis*  
Bottom: Collecting *Cercocarpus ledifolius* seeds

## Burkina Faso and Mali

In February 2003, the République du Mali became the latest country to be joining the world-wide network of MSBP partnerships. As announced in issue four, our partner is the Institut d'Économie Rurale (IER) in Bamako and more specifically their forestry department, headquartered at the Centre Régional de Recherche Agronomique (CRRRA) de Sikasso. In view of the strong ties among francophone countries in West Africa, collecting activities in Mali will be conducted together with our counterparts CNSF in neighbouring Burkina Faso. In this framework, a first joint expedition was carried out in Mali in April 2003 with remarkable results. The Malian endemic *Terminalia albida* was found and, out of the 20 species collected, 18 could be noted for their ethnobotanical use in fields like building materials, (folk) medicine, social uses, bee plants, and sources of food and fodder. Among the conserved species is *Anthocleista djalonensis*, threatened in Mali because of uncontrolled harvesting for use in local medicine. Staff of the Seed Conservation Department from RBG Kew in the UK will advise on the establishment of cold storage facilities in Sikasso.

## Malawi

The MSBP Malawi Programme was launched in May with the inaugural Steering Committee Workshop, held in Zomba, and attended by all the partners. During this meeting the budget and work plan for 2003/4 were agreed. The Programme partners are the Forestry Research Institute of Malawi (FRIM), the Malawi National Plant Genetic Resources Centre, the National Herbarium and Botanical Garden, the National Research Council of Malawi and RBG Kew. Seed collecting and processing equipment, supplied by the MSBP, has now been received by all the technical partners and training in its use has been given by Keith Manger and James Wood from the Seed Conservation Department of RBG Kew. The Malawi seed collecting programme, co-ordinated by FRIM, will commence in July with particular emphasis on Malawi's miombo woodlands.

## Botswana

The MSBP Botswana Programme was formally launched in April at the first meeting of the Technical Committee who oversee the Project. The meeting was held in Gaborone, and was attended by all the partners: the National Plant Genetic Resources Centre, the National Herbarium and Botanical Garden, Veld Products Research and Development and RBG Kew. During this meeting the budget and work plan for 2003/4 was agreed. Seed collecting and processing equipment has since been received by the relevant partners, and training in its use has been given by Keith Manger from the Seed Conservation Department of RBG Kew. The seed collecting programme for Botswana is currently being developed by RBG Kew's GIS Unit (rare and threatened species) and by the partners in Botswana (economic species). Collecting is expected to start in October/November.

Collecting *Acacia erioloba*

## Kenya

As phase one of the Seeds for Life Project comes to a close, the team has been reflecting on what has been a very busy year for all the institutes in the partnership.

Nearly 800 collections have been made during the first three years of the collecting programme with a considerable number of these being new collections for the Millennium Seed Bank. This year, a new species of Cyperaceae is to be described from one of the 2003 collections and a particularly rare species, *Kalanchoe boranae*, has been re-found in Northern Kenya and seed collections secured.

The next phase of the collecting programme will be committed to securing seed collections from many of the species endemic to the Kenyan drylands, as a result of a fantastic effort on databasing herbarium specimens from the East African Herbarium. These data are soon to be strengthened when Simon Kangethe visits the Herbarium at RBG Kew to enter the additional material from the collections in the UK onto the BRAHMS database.

Other phase two activities will include a considerable transfer of technological knowledge and skills to selected farming communities. This will impact on their ability to utilise effectively and sustainably many of their indigenous species.

Left: Orchid Collection, Botanic Garden, National Museums of Kenya  
Far left: "Flame of the Forest", Shimba Hills Reserve

Left: Asir Mountains at the South End of Wadi Baysh  
Far left: Mature *Cistanche tubulosa*

## Saudi Arabia

In the Kingdom of Saudi Arabia, the National Commission for Wildlife Conservation and Development (NCWCD) has been mandated since its inception in 1986 to conserve and develop the natural heritage in the country. After signing an Access and Benefit-Sharing Agreement with NCWCD in March 2002, a joint seed and herbarium collecting expedition was held in May of that year. However, the Saudi team continued collecting on their own up to the end of the season in September, yielding an extra 21 species. This independent collecting continued throughout the 2003 season, while no joint expedition could take place due to the (we hope temporarily) changed political circumstances. Meanwhile the NCWCD was successful in a bid to attract funding for a brand-new seed bank, replacing the much smaller and now defunct existing one. The Seed Conservation Department staff at RBG Kew are advising with its design. Until the building is completed, the Millennium Seed Bank will store the Saudi Arabian half of all collected material *in trust*. Later this year, training is planned in seed conservation techniques for some NCWCD staff.

# The Millennium Seed Bank Project in Namibia

The involvement of Namibia in the Millennium Seed Bank Project (MSBP) grew from earlier contact in 1991 and 1995, when the Seed Conservation Department of the Royal Botanic Gardens, Kew (RBG Kew) undertook some seed collecting missions in Namibia. A formal agreement between Namibia's National Plant Genetic Resources Centre (NPGRC) and RBG Kew was signed in May 2001.

The NPGRC is a young and small section of the National Botanical Research Institute in Namibia's Ministry of Agriculture, Water & Rural Development. Activities started in 1993 and now four permanent staff are employed. The section has to cater for all matters pertaining to plant genetic resources in Namibia, including crop species. The section was initiated through participation in the SADC (Southern African Development Community) Plant Genetic Resources Centre (SPGRC) programme, through which it received much of its equipment.

Because of the small staff component and the large mandate of the NPGRC, it was decided that collaboration in the MSBP should not involve too much additional work for the NPGRC and should be modest in scope. The collaboration focused on filling gaps especially in the conservation of wild plant species that make up the larger part of the NPGRC's mandate and are not adequately catered for by the SPGRC programme. Wild plant species in Namibia are very important economically because they form the basis of extensive livestock and game farming, one of the mainstays of the country's economy. Also wild plant resources are used by people directly for food, medicine, building and to generate income. Tourism, the fastest growing branch of the Namibian economy, is also reliant on



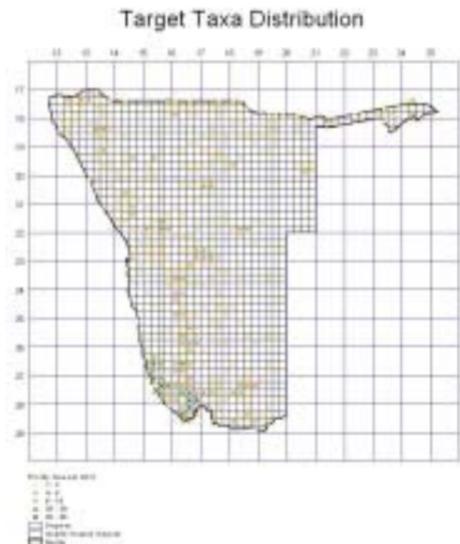
*Aloe dichotoma* and *Euphorbia* sp.



wild plant resources, since plants constitute a major part of the scenery for which tourists come to visit Namibia.

Initially the NPGRC decided to prioritise the species for collection under this project. Data on distribution, endemism, red data status and usefulness of the approximately 4000 indigenous higher plant species were collated and a database established to produce a list of around 200 target taxa. This process is ongoing and being refined as new information becomes available and as field experience increases. This aspect requires close collaboration with colleagues in the country, especially those from the National Herbarium and Red Data Listing project.

The project now has gone through two collecting seasons (2001 and 2002) and a total of 144 seed samples have been despatched to the MSB. Of these, 25 were priority species, 42 endemic, 23 near-endemic and more than 36 had some useful property.



Above and top far right: During the same season, places within a few kilometres from each other can have vastly different degrees of vegetation development.

# US seed conservation talks

Dr Chris Wood, from the Research Section of the Seed Conservation Department at the Royal Botanic Gardens, Kew, recently visited MSBP partners within the USA after presenting work from the *Semina Palmarum* project at the MONOCOTS III meeting in California.

Dr Wood visited Flo Oxley and Mark Simmonds at the Ladybird Johnson Wildflower Institute in Texas to discuss the screening of seeds for desiccation tolerance and the viability assessment of "microscopic" seeds, areas for which the MSBP has had two articles recently accepted for publication. Dr Wood also met with Joey Beltzer from the San Diego Zoological Gardens in California, where seed conservation activities have recently been established.

During his visit, Dr Wood advised on general areas of seed conservation research and joined Joey on a seed-collecting trip in the Anza-Borrego Desert. This is an area of extremes, where temperatures can reach in excess of 107°F, the highest in the USA. As such, it has a unique flora, including the unusual Ocotillo cactus (*Fouquieria splendens*) and the majestic California Fan Palm (*Washingtonia filifera*).



Above: The Ocotillo cactus showing its spiny nature



Above: California Fan Palm

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Left: Chris Wood and Joey Beltzer in front of the newly constructed seed bank at San Diego Zoological Gardens

# Darwin Initiative award boosts research on African Community Tree Seeds

Trees are of high utility in sub-Saharan dryland Africa and there is an urgent need to improve their conservation and sustainable use. Seeds can play a pivotal role in both activities, but knowledge of seed biology is poor and institutional resources (finance, technical and human) totally inadequate. A network approach to the work needs to be undertaken, collaborative research progressed and training delivered across 16 African Tree Seed and Biodiversity Institutes.

The Darwin Initiative grant of more than £180,000, (made by the UK Department for the Environment, Food and Rural Affairs), will boost work on developing methods for seed handling, especially for storage and germination, of a range of sub-Saharan Forest Genetic resources (SAFORGEN) species. This research project on community species aims to train 32 scientists from the 16 African country institutes in seed research and conservation techniques, to improve

their knowledge of experimental design and presentation of data, and to produce protocols and information on handling seeds of about 60 priority tree species. The main outcome will be a functioning network of tree seed-related institutes across the African continent. This initiative, which is also supported by gift-in-kind from the MSBP and by the International Plant Genetic Resources Institute (IPGRI), will have long-lasting effects on the capacity of these institutes to be actively involved in national programmes of *in situ* and *ex situ* conservation and collectively in the international arena.

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Hugh Pritchard, Project Leader, welcomes participants to the inaugural DIRECTS (Darwin Initiative Research Exercise on Community Tree Seed) workshop at the WTMB at Wakehurst Place, UK



The participants from thirteen nations outside the WTMB at Wakehurst Place, UK



Workshop participants enjoying themselves at the staff party at the Royal Botanic Gardens, Kew

# NEWS

## The MSBP's Herbarium Liaison Team at Kew

If you have ever wondered where your voucher specimens go, and who takes the time to look at them, you need wonder no more. The MSBP's Herbarium Liaison Officer who has the unenviable task of identifying all those vouchers is Stuart Cable, who joined the MSBP in November 2002. Stuart has many years of experience working as a generalist, mainly in Africa, and has a particular interest in producing plant identification guides.

Apart from naming voucher specimens, Stuart is busy developing a targeting programme and plant identification tools for the MSBP in Madagascar. He will shortly be joined by Neil Brummitt, another generalist with an interest in biogeography, who will start work in August of this year.

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## GIS in Botswana

Sharon Balding, the MSBP's Geographical Information System officer, has been working to develop a targeting programme for the MSBP programme in Botswana. Using the SABONET Red Data List as a starting point, Sharon has databased all the specimens on the list held in Kew's herbarium and has produced an expedition planning guide which includes species localities, phenology, descriptions and images. She has also used the herbarium specimen information to assess the conservation status of the data deficient species on the Botswana list, and will be publishing the results shortly.

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## Donations Programme Update

The Donations Programme seeks to encourage the use of the Millennium Seed Bank's facilities by organisations needing secure long-term storage facilities for their seed material. Successful collaborations are currently under way in Canada, with the Jardin botanique de Montréal and the Devonian Botanic Garden, Alberta, and in Italy with Trento Natural History Museum, the Botanic Garden of Pisa and the University of Pavia. Two members of RBG Kew's Seed Conservation Department will be taking part in collecting expeditions in Trentino this summer.



The National Botanic Garden of Belgium have duplicated the majority of their native seed collections by sending them to the MSB and collaborations are currently being discussed with organisations in New Zealand, Kyrgyzstan and Greece.

For further details of the Donations Programme, please contact:

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## Seed List now available on internet

The Millennium Seed Bank Index Seminum has now been published on the internet at [www.rbgekew.org.uk/data/seedlist](http://www.rbgekew.org.uk/data/seedlist).



You must register as a user first and, once you have successfully registered (full instructions on the web site), you will be able to search the

seed list and print out your request. When you submit requests, we will still require a signed Material Supply Agreement before we can process your order. We can supply a printed copy of the Seed List, if you are unable to access the internet.

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## Extra funding for island floras

The Millennium Seed Bank Project has received generous funding from the UK Foreign and Commonwealth Office to support its work. The grant covers seed collecting work in four of the UK's Overseas Territories – Ascension Island, the British Virgin Islands, the Falklands and St. Helena.

The funded work, which will extend over a period of one year, involves training of staff, provision of local seed storage facilities and some fieldwork. The majority of the UK's Overseas Territories are small oceanic islands

with high rates of plant endemism. They are also subject to the pressures facing many small islands, such as invasive alien plant and animal species, deforestation and tourist impacts.

This work is a logical extension of the UK Flora Programme, which has so far banked around 97% of the UK's native flora.

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## WE WANT TO HEAR FROM YOU!

**Samara is your newsletter, so send us news and articles about yourself and your work.**

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