



# samara

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

## Welcome to the first edition of Samara.

Why is the newsletter called Samara? A botanical name, it reflects the enthusiasm for plants that we all share and embodies the values of the Millennium Seed Bank project. As a fruit, Samara is a combination of old parental tissue and new seed that is the product of cross fertilisation. Within the project, the old is RBG Kew's earlier contribution. The new will be the work we undertake together, a cross fertilisation of our ideas and knowledge. As a fruit, Samara is winged to aid dispersal. Furthermore samaras, carried on the wind, propel their seed to new locations where they can germinate and grow away from their parent. Here, I see reflections of both the aspirations for our growing network and the subsequent dispersal of our conserved seeds from the present generation to those yet to come. Finally, I noticed in my dictionary that Sam, the first syllable of our newsletter's name, is a Middle English word in its own right. It means, appropriately, "together".

### Roger Smith,

Head of Seed Conservation Department,  
Millennium Seed Bank

## Rare plants rediscovered in the Northern Cape

A recent trip was made to the Northern Cape of South Africa by Erich van Wyk and Priscilla Burgoyne, of the National Botanical Institute, Pretoria, and Paul Smith, of the Millennium Seed Bank project, as part of an NBI/MSB collaboration. The expedition's goals were to collect seeds for the MSB, mainly from the family Mesembryanthemaceae, and to collect any good seeding species endemic to the region. Mesembs were targeted as the area is well known for numerous endemic species and because they were in full seed at this time of year. The field trip was a great success in terms of numbers of species and seed collected – 72 species including 46 mesembs.

Of greater botanical interest was the rediscovery of two long-lost plant populations. The first was *Dioscorea elephantipes* (L'Hérit.) Engl. (Dioscoreaceae), a spectacular shrubby climber up to 1.5 m high with a huge caudex reaching a diameter of up to 75 cm, mainly exposed above ground. Its reticulated skin resembles that of an elephant, hence the specific name. Owing to its unusual appearance, this attractive plant has been overcollected and now it is threatened in the wild. It has not been seen near Komaggas since 1954.

Using rough directions provided by Johan Hurter (NBI, Lowveld National Botanical Garden), our team spent a whole day searching for this elusive species, with no success. Finally, on the point of giving up, we asked a local shepherd, who immediately recognised the plant we were looking for, and directed us to a very healthy population. We found approximately 1000 plants concentrated on a steep mountainside, on a scree slope. Although there was no seed, we were able to thoroughly document the location, size and ecology of the population.



Our second interesting find was *Cylindrophyllum hallii* L. Bolus (Mesembryanthemaceae) (below, left) on a plateau near Loeriesfontein (above). This plant is of great interest as its sister species all come from the Little Karoo. In notes accompanying the original description, the collector (H. Hall) states that only about 200 plants were seen. Again we followed, more or less, telephoned instructions from Johan du Toit, an amateur succulent enthusiast from George, who directed us to the site of this single known population.

This population has not been documented or collected since 1960, and we were very excited to find it. Only about 219 living plants were left, with clear signs of predation. We saw many dead plants, possibly victims of drought or utilisation by animals. Fortunately, seed was in ample supply and we were able to collect capsules from some 85 plants very safely, taking less than 5% of what was available. This is exactly the kind of species that needs *ex situ* conservation – down to only one known wild population, severely threatened at the site and a candidate for Red Data listing. The germination protocol for this species will now be worked out to ensure that if the remaining population should die out, seed and the protocol would be available for its reintroduction.

Paul Smith, Priscilla Burgoyne and Erich van Wyk.



# A selection of international programme activities

## United States

The Bureau of Land Management is working with RBG Kew to collect seed from US native species that could be useful for restoration purposes. Currently 29% of the US flora is threatened, and native plant communities are at continuing risk from wild fires and invasion by introduced species. The project will bring together a number of Federal and non-governmental partners under the umbrella of the Plant Conservation Alliance (PCA), a network of plant conservation organisations throughout the US. Working through the PCA, the Partners will set collecting priorities, will co-ordinate training for volunteer collectors, and will initiate the seed collecting activities. Once seed has been collected, RBG Kew is taking responsibility for processing the majority of the seed collections, for making seed samples available for restoration purposes, and for returning duplicate collections to the US.

Pilot collecting missions took place in Idaho and Oregon states last year, and the first collections are already undergoing germination testing. Further training and collecting activities are now underway in the south-west states, tapping into a local network of amateur and professional botanists. As the project develops, further attention will be given to local seed conservation capacity building and the possibilities of joint research in areas of interest.



## Lebanon

The Lebanese Agricultural Research Institute (LARI) and Kew's seed bank have been jointly collecting in Lebanon since 1996, before the Millennium Seed Bank was formally established. A formal Agreement between LARI and RBG Kew was signed in July 2000, placing future work, as well as the collections from 1996, 1997 and 1998, under its terms and conditions. Lebanon is in many ways a seed collector's paradise: it harbours an estimated 2,600 species, a flora twice the size of the United Kingdom. Most precious among these are over 300 endemics. The annual rainfall, varying from 150 mm / year in the arid east to over 1000 mm in the high mountains, explains a lot of this wealth, as does the altitudinal variation between sea level and 2,700 m.



## Kenya

After a project development process which has spanned some 2 years, the local collaboration with our Kenyan Partners has manifested itself in a project with a strong local identity called "Seeds for Life". A partnership consisting of RBG Kew and 5 local institutes, namely the National Museums of Kenya (NMK), Forest Department (FD), Kenya Forestry Research Institute (KEFRI), Genebank of Kenya (KARI) and the Kenya Wildlife Services (KWS), means that the Seeds for Life project has tremendous potential for achieving measurable plant conservation for Kenya. Access to plant distribution data is through the East African Herbarium (at NMK) and will be supported by data from the Herbarium at Kew.

Collections from national parks and forest reserves will be facilitated by KWS and FD who will also provide the necessary interface with farmers and community groups through their extension services. The Seeds for Life project places considerable emphasis on the value of improving on-farm utilisation technologies. A strong collection programme has started and capacity building in the form of UK-based and local training initiatives and supply of vehicles and laboratory equipment completes the first three year phase of the Seeds for Life project.

With population pressure, urbanisation and the aftermath of the civil war being the main threats to the biodiversity, *ex situ* conservation of a flora under siege is timely. The past four expeditions have shown remarkably little overlap in collected species. Increasingly, however, collecting will be targeted, with simultaneous consultation with local experts and collecting throughout most of the year. Orchids and endemic species of

*Iris* and of *Cyclamen* are among the chief targets.

Plans for a national seed storage facility, meanwhile, are advanced. As the collaboration develops, further attention will be given to capacity building and joint research.



## South Africa

The Millennium Seed Bank project's collaboration with the National Botanical Institute (NBI) in Pretoria, South Africa has been running for over two years now. A formal agreement between the two institutions was signed in May 2000. Erich Van Wyk, the MSB Co-ordinator at NBI, has been the mainstay of the programme, and has developed a wide network of contacts in South African botany, which has greatly helped him in his quest for priority species for *ex situ* conservation. In South Africa the collecting programme has concentrated on threatened and endemic species. Erich, accompanied by various experts and colleagues, has had some notable successes over the past couple of years. These include the discovery of South Africa's first miombo woodland in the Soutpansberg, where *Brachystegia spiciformis*, a 20 metre tree, has remained undetected until now, the rediscovery of a lost population of the elephant's foot yam *Dioscorea elephantipes*, and the rediscovery of the last remaining population of *Cylandrophyllum hallii* (see page 1). Erich has recently been joined by Peter Gavhi, who will provide a welcome boost to the South African programme, particularly when Erich begins his PhD studies later this year.

## Australia

The Western Australia Department of Conservation and the Botanic Garden and Parks Authority (BGPA) have joined the Millennium Seed Bank project in a locally managed project focusing specifically on the threatened species of the extraordinary flora from Western Australia. Species from the State's threatened flora list and from habitats threatened by

agricultural expansion and the process of salinisation form the bulk of the collecting priorities for the first three years. Species recovery plans are well developed and the project will contribute to the implementation of these recovery plans. Some training of seed collecting staff and the continuation of historical research collaboration will encourage better interaction between MSB and WA staff. The conservation of Orchidaceae forms an important component of the work of the BGPA and a specific collection and research programme dedicated to the 66 threatened orchid taxa is included as part of the partnership.



## Madagascar

Silo National des Graines Forésières (SNGF), Madagascar's seed bank, have been fully fledged partners of the Millennium Seed Bank project since September 2000, when the Director of SNGF, Guy Rakotondrany, and Minister Rajohnson (Ministry of Water and Forests) came to London to sign an Access and Benefit Sharing Agreement with RBG Kew. Since then, Faly Randriantafika has been appointed as MSBP Co-ordinator at SNGF and several field trips have been made to the South and South West of Madagascar. With more than 80% endemism, there



are many fascinating plants in Madagascar; interesting collections made so far include two of Madagascar's seven indigenous baobabs, *Adansonia za* and *A. rubrostipa*, and a wild Flamboyant species *Delonix floribunda*. SNGF, with the help of the MSBP, is currently upgrading its facilities to enable it to hold the national wild seed collection for Madagascar. In addition, a number of SNGF staff are undergoing further training ranging from diplomas to PhDs.

# NEWS

## SID on the web

The Seed Information Database will be available in the summer via Kew's website at

<http://www.rbgekew.org.uk>.

This first version contains information on seed storage behaviour. The ultimate aim is to be a comprehensive database on all aspects of seed biology. Contact Dr John Tweddle, +44 1444 894118 / [j.tweddle@rbgekew.org.uk](mailto:j.tweddle@rbgekew.org.uk), for more information.

## Seed conservation landmark conference

*Seed Conservation: Turning Science into Practice*, a Kew international conference, will be held from 26 July to 31 July in the Wellcome Trust Millennium Building. The main aims of this meeting are to bring together scientists and practitioners to discuss developments in seed conservation and to facilitate the creation of a benchmark textbook on seed conservation. For more details, contact Dr Hugh Pritchard, +44 1444 894140 / [h.pritchard@rbgekew.org.uk](mailto:h.pritchard@rbgekew.org.uk)

## New staff

**Dr Peter Toorop** has joined the MSBP as leader of the Diagnostics Group, which will be working on the diagnostics of seed storage and germination. Peter joins the MSBP from Wageningen University, the Netherlands. He can be contacted on +44 1444 894143 / [p.toorop@rbgekew.org.uk](mailto:p.toorop@rbgekew.org.uk)

**Dr Kate Gold** joined us recently as the Seed Conservation Department's Training Manager. With over 8 years' experience in overseas development, most recently with ITDG (Intermediate Technology Development Group), she is responsible for coordinating the training programme of the Millennium Seed Bank project. She can be contacted on +44 1444 894159 / [k.gold@rbgekew.org.uk](mailto:k.gold@rbgekew.org.uk)

# Devising seed storage protocols

Many conservation programmes are hampered both by a lack of understanding of the biology of tropical tree seeds and by practical problems with their storage.

These problem species include African multipurpose trees and those used in agroforestry systems in many developing countries in the tropics.

A large number of tree seeds from the tropics are damaged early during dehydration and are potentially susceptible to freezing injury. Thus, they cannot be dried and stored for long, using conventional methods. And more intriguingly, most of these seeds have no comprehensive storage records.

As part of a programme of collaborative research, the Millennium Seed Bank project is investigating the prospect of identifying optimum storage conditions without damaging the seeds. Thermal analyses, water sorption isotherms and survival during controlled freezing tests are being studied on a range of these species in relation to their chemical composition. Our initial working seeds include *Azanza garckeana* (F. Hoffm.) Exell & Hillc., *Kigelia africana* (Lam.) Benth., *Tamarindus*



▲ Christiane Yaméogo at work in the seed research laboratory.

▲ Drs Moctar Sacande, Hugh Pritchard and William Omondi in the seed research laboratory at the MSB.

*indica* L. and *Vitellaria paradoxa* Gaertn.

Contributors to this research include William Omondi from the Forest Seed Centre (KFSC) in Kenya and Christiane Yaméogo from the Centre National de Semences Forestière (CNSF) in Burkina Faso, who both visited the research laboratory in the Wellcome Trust Millennium Building at Wakehurst Place, from October to December 2000.

For more information contact: **Moctar Sacande**, +44 1444 894143 / [m.sacande@rbgekew.org.uk](mailto:m.sacande@rbgekew.org.uk)



## The Donations Programme

The Millennium Seed Bank is keen to encourage the use of its state-of-the-art facilities by any organisation seeking long-term storage of seed material. Universities, NGOs, botanic gardens and government departments are encouraged to make use of the Seed Bank, either as the primary repository of *ex situ* material, or as a back-up for their own storage facilities.

Steve Alton is responsible for encouraging such collaborations and would like to hear from you. Partnerships are currently being set up in Canada, Hungary and Crete.

Contact **Steve** on +44 1444 894119 / [s.alton@rbgekew.org.uk](mailto:s.alton@rbgekew.org.uk)

**WE WANT TO HEAR FROM YOU!**  
**Samara is your newsletter, so send us news and articles about yourself and your work.**

Contact the editor **Fiona Ainsworth**,  
Librarian & Information Officer  
Royal Botanic Gardens, Kew  
Wakehurst Place, Ardingly, West Sussex, RH17 6TN

tel: +44 1444 894178 fax: +44 1444 894110  
email: [f.ainsworth@rbgekew.org.uk](mailto:f.ainsworth@rbgekew.org.uk)



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## Dormant seeds yield to the surgeon's scalpel

Staff in the MSB's Technology & Training Section have found that seed dormancy in tropical grasses can be broken by surgical treatments. Using fine forceps and a sharp scalpel, the trick is to remove a small portion of the pericarp on the dorsal surface of the caryopsis directly above the embryo.

A shallow slicing action ensures that the delicate underlying embryo is not damaged. Other partially effective treatments include alternating temperatures [eg. 33/19°C or 40/20°C (12h/12h)], and addition of potassium nitrate (1 mM) to the germination medium. For highly dormant seed collections, treatments combining all three factors give the best results.