



# samara

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

## Restoration ecology in Western Australia

As a partner from Western Australia, the long-term benefits of a visit to the Millennium Seed Bank Project (MSBP) go far and wide. Most people expect Botanic Gardens to play a significant role in *ex situ* conservation, especially within their own region. Certainly they have become the major focus of conservation programs around the world.

The Botanic Gardens and Parks Authority in Perth, Western Australia is no different in its efforts at *ex situ* conservation. It stores seed through its Seed Science and Technology Centre. The Centre stores seeds of over 2500 species from Western Australia's rich and diverse flora. Living plant collections are maintained in the nursery and Botanic Garden facilities.

Along with this focus, there is a major focus on the restoration ecology of Western Australia's own significant natural bushland areas. The Kings Park Laboratories, with their research staff, provide leadership in the latest restoration techniques.

Currently the Botanic Gardens and Parks Authority administers over 500 hectares of mostly original *Banksia* woodlands, with more being added over the next few years. Urban woodlands in any capital city are extremely important and Perth is fortunate indeed to have these areas.

A major part of the reconstruction of these sites is seed collection. Only local provenance seed is used in any restoration program.



Above and below: Western Australia's rich and diverse flora

Provenance collections are being used for a long-term conservation collection as well as actively used for revegetation in the bushland. Recently twelve new research positions were created to unravel many of the problems facing the ecology of local flora restoration. To get it right locally, in our own backyard, is very important if we are to position ourselves to help deal with wider issues facing our state, such as salination and overclearing.

Best practice restoration ecology is crucial and the Authority is building on its reputation with the development of a new ecology centre. This new centre will provide excellence in urban bush management principles.

The Authority are also involved in minesite restoration projects throughout Western Australia. Seed collecting skills are being shared as far afield as Tanzania, where a team from Kings Park is helping with a large minesite restoration project.

All these projects are being aided in a very positive way by the knowledge gained at and contact with the MSBP. Regimes of storage for recalcitrant species, relative humidity when drying and the correct timing of collections for the optimum seed viability are areas that we have taken a leap forward in by having access to the MSBP's resources.

I look forward to returning to the MSBP and thank the staff there for openly sharing their ideas and knowledge. These will be put into practice in many remote and unusual places so that, in the future, we might all benefit.

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# A selection of international programme activities

## Chile

Participants on the recent training course *Collecting seeds of native species for ex situ conservation* spent 2 days in La Campana National Park evaluating populations and seeds of several potential collections, including the vulnerable endemic palm *Jubaea chilensis*, a flagship species in La Campana. Sampling strategies were decided upon, and collections made of two other vulnerable species, *Beilschmiedia miersii* and *Crinodendron patagua*. The 6-day course, based in Olmue, Region V, brought together 14 participants and 7 tutors from 13 different institutes, fulfilling one of the main aims of the course which was to exchange experiences and promote discussion. Several new links were established and it is hoped that this will facilitate a network working with INIA and RBG Kew on the collecting and conservation of seed from endemic, vulnerable or threatened Chilean plants.

Right and far right:  
Delegates on the  
course evaluating  
potential collections



## 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. This is done through the development of protected areas with key biological importance (*in situ* conservation) and through captive breeding and re-introduction of threatened (depleted) species. Thus, there is both a botanical and a zoological component to NCWCD's work. There is also *ex situ* conservation of plant species, facilitated by a small seed bank in Riyadh. In addition, NCWCD serves as the national focal point in the international conservation scene, and has, for instance, hosted meetings of the IUCN Species Survival Committee. All this makes the NCWCD the obvious local counterpart for the MSBP. As a result of constructive negotiations, an Access and Benefit-Sharing

## USA

Over the last year, the MSBP's work in the USA has really gathered pace as new partnerships are forged under the 'Seeds of Success' Project. A grant to the Bureau of Land Management (BLM) from the National Fish and Wildlife Foundation is allowing it to co-ordinate the setting of targets and seed collecting guidelines and facilitate the participation of Federal and civil society organisations in support of the project.

BLM itself has already starting collecting seeds on public lands in the Western States. BLM's first priority is to collect the species needed for restoration, but other conservation targets will be collected over the next ten years. It is also hosting 5 Student Conservation Association teams, which are collecting seeds in these states.



Far left: *Adenium obesum* forest, Wadi Baysh, Saudi Arabia

Left: Qutaiba al-Sado'on collecting seeds from *Hyphaene thebaica*

Agreement between the NCWCD and the MSBP was concluded in January 2002 and signed on 4 March 2002, paving the way for joint collecting, training opportunities and possible research between the NCWCD and the MSBP. The first activity, however, took place well before the signing of the Agreement: a Saudi staff member participated in the 2001 Kew Plant Conservation Techniques course. The first joint seed and herbarium collecting expedition was held during May 2002, yielding 35 collections and 8 identified species to be collected subsequently. Later in 2002, this will be followed by more capacity building through both formal and individual training for NCWCD staff at the MSBP.

On 10th May 2002, the Lady Bird Johnson Wildflower Center in Texas formally launched its involvement in Seeds of Success with the signing of an Access and Benefit Sharing agreement with RBG Kew. The Center will be collecting the flora of the Edwards Plateau.

In California, the Vital Seeds project has received funding, and training and field work are already under way. And finally, a project is under development in the Mid West, possibly in collaboration with the Chicago Botanic Garden.

Far left: Valerie Geertson (BLM Boise Field Office IDAHO), collecting *Rosa Woodsii*  
Left: Carol Spurrier, Seeds of Success National Coordinator, collecting *Bebbia juncea*



## Lebanon

In Lebanon, Simon Khairallah has been out in the field for much of the year, collecting seeds for the Millennium Seed Bank Project, thanks to support from B.A.T. Although RBG Kew and the Lebanese Agricultural Research Institute (LARI) have been jointly collecting seeds of wild species since 1996, the relatively large Lebanese flora of around 2,600 species has allowed Simon to collect a steady stream of new species.

Simon also spent two weeks at the Millennium Seed Bank Project in September 2001. During this time he undertook training in seed curation techniques, such as cleaning and drying, and herbarium techniques. This training will help him to develop the seed banking facilities at the LARI. This year a seed counter has been bought, together with sieves and storage bottles.

Above top: The Cedars on Mount Lebanon  
Above: Simon Khairallah collecting *Hyoscyamus albus*, Ainjar Ruins

## South Africa

The Millennium Seed Bank Project's collaboration with the National Botanical Institute in South Africa is expanding this year, with the recruitment of Philip Botha, who began work as a seed collector in July. Philip has been based at NBI Kirstenbosch for many years and brings great seed collecting experience and a deep knowledge of the Western Cape flora to the job. Philip is attached to the Horticulture Department at Kirstenbosch and will concentrate on collecting rare and threatened species in the Western Cape. A second appointee to the South African team is Livhuwani Nkuna, who has joined the Pretoria team as Assistant Botanist. We'd like to take this opportunity to welcome both of you to the Project, and look forward to working with you.



Left: *Leucospermum*  
Below: *Phaenocoma prolifera*, now safely in the Millennium Seed Bank



Left: Sun-drying facilities at Kenya Forestry Seed Centre  
Below: Seed cleaning in the field  
Below right: The rare Kenyan endemic *Baphia keniensis*



## Kenya

As the Seeds for Life partnership in Kenya moves into its second year, achieving the target of some 800 collections over the first three-year phase period seems assured. As part of the capacity building component of the collaboration, seven technical staff from the National Museums, National Genebank and Forestry Seed Centre are currently attending a 9-month diploma course in Plant Genetic Resource Conservation at Maseno University in the west of the country. Prioritisation of collecting targets is currently being addressed by staff at the East African Herbarium, who have embarked on an effort to database all specimens of dryland endemics (c.1100 species) found in their collections. To date, some 3000 specimen records over 35 families have been logged onto BRAHMS database software. Staff at the Kew Herbarium are augmenting these data from the Kew collections and, with the use of GIS technologies, will soon be able to earmark collection 'hotspots' for the Seeds for Life collection teams.

# The Convention on Biological Diversity – latest developments

Since its inception, the MSBP has been inspired and guided by the Convention on Biological Diversity (CBD). As the Project gains in experience and expertise, we should start to take responsibility for providing input back into the CBD – both in terms of developing the Convention and assisting its implementation.

In order to improve our engagement with the CBD process, several MSBP staff members recently attended the sixth Conference of the Parties to the CBD (COP6), held in The Hague, 7-19 April 2002. Roger Smith, Paul Smith and Clare Tenner, together with the MSBP Visiting Researcher, Moctar Sacande, from Burkina Faso, joined other RBG Kew colleagues at the Conference. Several friends from our partner countries were also at the Conference, including Stella Simiyu from National Museums of Kenya and Brian Huntly from NBI in South Africa. In addition, several MSBP partners played an important role by speaking with their COP6 delegates prior to the Conference.

A key agenda item for the MSBP was the Global Strategy for Plant Conservation, which was adopted by the COP. The Strategy includes 16 'outcome-orientated' targets for 2010. These provide an internationally-agreed framework for plant conservation activities which the MSBP can both contribute to and benefit from. The headline target for the MSBP is target 8:

*'60% of threatened plant species in accessible ex situ collections, preferable in the country of origin, and 10% of them included in recovery and restoration projects.'*...

We can also contribute to:

- **target 9** on the conservation of socio-economically valuable plant species
- **target 13** on halting the decline of plant resources, and associated local and indigenous knowledge, innovations and practices that support sustainable livelihoods
- **targets 14-16** on promoting education and awareness about plant diversity, including increasing the number of trained people working with appropriate facilities

Several of the targets relate to *in situ* conservation and sustainable use. It is important that we explore and communicate to others the ways in which seedbanking can support these activities – the MSBP has already made a start with the production of a poster on this topic. This is looking forward to COP7 in 2004 where 'protected areas' is already scheduled as a key agenda item.

Finally, the MSBP will benefit from targets in the Strategy relating to better understanding and documenting plant diversity and conservation status. Such information will enable us to better target our collecting of rare, endemic and threatened plant species.

Another relevant outcome of COP6 was the adoption of the Bonn Guidelines for Access and Benefit Sharing (ABS). These are voluntary, non-binding guidelines for countries in the development of their access and benefit sharing policy and to guide stakeholders (such as seedbanks) in the negotiation of ABS agreements. They outline the responsibilities of both users and providers of genetic resources and the steps in the access and benefit sharing process.

The COP also agreed a Strategic Plan for the Convention, an expanded programme of work on forest biological diversity, guiding principles concerning alien invasive species and a work programme for the Global Taxonomy Initiative. The COP also produced a

Ministerial Declaration calling on the World Summit for Sustainable Development (to be held in Johannesburg, 26 August – 4 September 2002) to, amongst other things, reconfirm the commitment to 'stop and reverse the current alarming biodiversity loss' by 2010.

COP6 paid very little attention to the Work Programme on Dry and Sub-Humid Lands other than to note progress on implementation. However great progress was made on this prior to COP6 at a meeting of technical experts held in Montreal, 18-22 March. Roger Smith, Head of the Seed Conservation Department at RBG Kew, represented the UK. The experts were asked to carry out a number of tasks including:

- assessing information on the values, status and trends of biodiversity in dry and sub-humid lands
- assessing the progress and effects of measures taken for the conservation and sustainable use of biodiversity
- making proposals for further outcomes and activities



The group made good progress on all these issues and will conclude their work at a second meeting, to be held in September 2002. Again this Work Programme provides a political basis for the work of the MSBP.

Further information on all the COP6 decisions is available on the CBD website at [www.biodiv.org](http://www.biodiv.org). Copies of the MSBP poster are available from Clare Tenner at the MSB ([c.tenner@rbgkew.org.uk](mailto:c.tenner@rbgkew.org.uk)). Clare will continue to follow CBD initiatives for the MSBP and is keen to discuss with partners the role of the MSBP in the CBD.

# Effects of surgical treatment, nitrate and alternating temperature on seed germination in **tropical grasses**



Seed collections of tropical grasses are amongst the most problematic for germination testing in the Millennium Seed Bank Project. Variation in seed dormancy in grasses is attributed to their remarkable geographic and climatic adaptability; grasslands occupy one third of the world's land surface. Despite this variability, evidence has shown that surgical treatment of the pericarp, application of nitrate and incubation at alternating temperatures in the light stimulate germination in many cases. The relative effectiveness of these factors is being studied by staff of the MSBP Technology & Training Section's Interface Team who presented their preliminary results as a poster at the VII International Workshop on Seed Biology held in Salamanca, Spain in May.

Initial conclusions from studies on 72 collections representing 54 species demonstrate the potential of factorial experiments to identify trends at the tribal and generic level. For example, results show that there is a very high probability that seed collections from the

Surgical treatment of a *Dactyloctenium aegyptium* seed (1mm), showing the careful excision of the pericarp directly above the embryo

Eragrostideae will respond positively to surgical treatment of the pericarp. Some genera, such as *Dactyloctenium*, may be particularly responsive to nitrate and, in many cases, germination was highest when all three factors were present.

As the data set grows to include many more collections and additional factors, multivariate techniques will be used to further analyse the relationship between seed germination traits, taxonomy, ecology, distribution and climate.

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## **UNAM Mexico** become full partner in MSB Project

The National Autonomous University of Mexico (UNAM) and RBG Kew have signed an Access and Benefit Sharing Agreement following a period of consultation with Mexican authorities SEMARNAT and CONABIO. RBG Kew and UNAM have enjoyed a productive informal collaboration since 1993 (see Samara Issue Two) and Kew recently received a donation from the organic food company Seeds of Change to support collecting and conservation activities in the Tehuacan-Cuicatlan valley. The partners are now in a better position to consolidate project activities within three programmes: Capacity-Building, Plant Conservation and Sustainable Use. With new funding, the project will expand into Baja California and Chihuahua.

Dr Patricia Davila at UNAM's FES-Iztacala campus heads up the Mexican team and is looking forward to the next stage of the project development. "We have developed a flexible scheme for postgraduate students which will allow them to develop their knowledge and abilities in study programs in Mexico and abroad. The search is now underway for financing for research and extension activities, and for improved facilities. In this way UNAM can gradually consolidate its developing research portfolio."

Michael Way, the MSB Project's Americas Co-ordinator, is very pleased to have reached this stage. "Mexico is the thirteenth country to formally join the MSB Project, and UNAM's expertise in the taxonomy, ecology, and sustainable use of Mexican plants will be valuable to the MSBP."



Martin Paredes Flores and Juan Ismael Calzada (UNAM) evaluating a potential seed collection assisted by Michael Way (centre).

# NEWS

## Seed Conservation Techniques training course

9-20th September 2002

The 2-week residential course, based at the Wellcome Trust Millennium Building, will bring together MSBP partners from several countries, sharing their experiences and building their skills to collect, conserve and manage *ex situ* seed collections. The course will provide practical training in collecting, cleaning, drying, storing and testing of seeds of wild species. It will include the theoretical background of seed moisture relations, seed storage behaviour, germination and dormancy, prediction of seed storage life, and theoretical and practical aspects of seed bank management and seed bank design.

There will also be opportunities to discuss actual and potential uses of *ex situ* seed collections in restoration ecology, species re-introduction and sustainable use initiatives.

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## Dulce Alves de Silva

As part of her PhD at the University of Sheffield, supervised by Dr Ken Thompson, Dulce Alves de Silva has been working closely with Matthew Daws of the Research Section at the MSBP to study germination in a range of Brazilian Cerrado plants. Dulce is supported in her studies by the Brazilian Ministry of Education (CAPES) and the Amazonian Environmental Research Organisation (IPAM). She is interested in seedling responses to environmental variation and climate change and during her visit to the MSBP has undertaken germination tests to determine optimum germination conditions for her study species. Cerrado species are adapted to survive in fire prone environments and therefore some of the study species are hard-seeded and require mechanical scarification or heat treatments to facilitate germination.

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# Mini seed bank

Arising from studies into improved seed conservation technology, MSBP staff have developed a 'mini seed bank' kit that will enable people to collect, process and store seeds following the same principles adopted in large scale seed banks. The mini seed bank has been developed for three main reasons:



- To promote the Millennium Seed Bank Project and the principles of plant conservation
- To provide the materials and knowledge for members of the public to maximise the useful life of garden seed collections
- To educate people on the principles of seed conservation technology

The main component of the kit is a high quality polythene box that acts both as a drying chamber and as the 'seed bank' at the end of the season. Also supplied are seed containers, silica gel and an ingenious indicator system that mimics the seed drying process. The mini seed bank will be sold through the Kew shops, other selected retail outlets, and via mail order for £19.95, and all proceeds will be used to support the MSBP.

Enquiries and orders should be sent to:  
miniseedbank@kew.org

## Chinese visitor supports Millennium Seed Bank palm project

A critical assessment of the seed conservation potential of palms is urgently needed. Little information exists currently on either the germination or storage of the vast majority of species. Semina Palmarum, a five-year project within the Millennium Seed Bank Project (MSBP), aims to collate existing information and generate new data on seed conservation of around 400 species.

Several international collaborations are being initiated to support the project, the first of which is a visitor from the People's Republic of China. Wen Bin, from the Xishuangbanna Tropical Botanic Garden (XTBG) in Yunnan province, builds on an earlier collaboration between Kew's Seed Conservation Department and XTBG (detailed in the last issue of Samara). Bin, who will be with the MSBP for a year, will focus on desiccation tolerance, storage and germination of palm seed collections from XTBG, as well as other sources.



Bin standing next to a *Pritchardia hillebrandii* in the Palm House at Kew

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

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