



samara

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

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Empowering local communities in plant and seed conservation through training: the Kenyan experience

Benjamin Makumbi is a teacher at Lungu School in Kenya's semi-arid Makueni District. When he first started working at the school he was concerned that children playing in the dusty school grounds had no shade from the hot sun (temperatures in Makueni reach 34°C in the dry season). Mr Makumbi started a school tree nursery to provide seedlings to plant around the playground and in the school compound. The children (there are around 70 members) collect the seeds, tend the resulting seedlings and plant them around the school. The child with the healthiest tree wins a prize. Unable to afford standard nursery "tubes", the children use recycled plastic food tubs as plant pots. The school has no permanent water supply and children have to carry water in every day from several kilometres distance, both to cook their World Food Programme school dinners and to water their tree seedlings.

Lungu School represents just one of the many community groups in Makueni, Mbeere and West Pokot districts who have benefited from training delivered by the Kenya Seeds for Life Project (SFLP). Many are 'self-help' groups set up by women to produce and sell seedlings to provide money for schooling and other household expenses. Groups also plant seedlings on their own farms and around the local community (*in situ* conservation). The 'Kinetat Environmental group' in Kapenguria, West Pokot, has been involved in environmental education activities with other community tree nurseries in Lelan Division, an important watershed for West Pokot District.

The SFLP had found that although people were keen to plant trees, they lacked some skills in seed procurement, seed germination and nursery production and the training programme was developed to address these issues. The Project has produced a training manual on 'Seed collection, handling and nursery management' for use by local community trainers. The 2-day courses cover the basic principles of seed collection, processing, germination and nursery techniques and management.

Training is delivered by scientists from the SFLP partner institutes – National Museums of Kenya (NMK), Kenya Forestry Research Institute (KEFRI), Gene Bank of Kenya, Forest Department (FD) and Kenya Wildlife Service – supported by local FD extension staff. Since June 2005, 7 courses have been held and more than 150 people have been trained. 1-2 participants from different local groups are selected to attend. These participants then pass on what they have learnt to fellow group members. FD extension staff provide follow-up after the training and address any problems and issues that may arise.



Participants in a Seeds for Life Project training course.

Since 2000 the SFLP has made more than 1350 collections. SFLP partners are now planning to use some of these seed collections in a pilot rehabilitation project in a degraded area of Kisau Block Forest, near Lungu School. Seedlings are being raised at NMK and KEFRI and by local community nurseries. Species have been selected to include those in high demand by local communities and which exhibit germination and handling problems, for example, *Melia volkensii*; a highly sought-after local multipurpose tree.

Associated grasses, aloes and other shrubs will also be planted in order to return the forest to a semblance of the original vegetation. Lungu School and the local community will be involved in the rehabilitation and FD will protect the rehabilitated site. Planting is planned for November when rain is usually more reliable.

Other activities with local communities include participatory research into traditional methods of seed handling, drying, storage and propagation (see *Samara 10*).

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A Year with the MSB Cape Team

Sir Francis Drake in the *Golden Hind* rounded the Cape in 1580. In the ship's log appears this sentence: 'This Cape is the most stately thing and the fairest Cape we saw in the whole circumference of the earth.'

The MSB team based at Kirstenbosch Gardens bears witness to this sentence every time they go out to collect. Although Sir Francis Drake never ventured inland further than the Cape Peninsula, I'm positive he would not have changed his mind. Over the collecting season of 2005 the team has been to and seen some amazing places.

The first port of call in February 2005 was the Van Stadens Mountains in the Eastern Cape Province; here the very threatened *Leucadendron orientale* (listed as vulnerable on the Red Data List of 1996) was collected, in the form of both seed and cuttings. Our camp site was on the banks of a river running through the small town of Kirkwood and visited at night by a hippopotamus which resulted in all four members on the collecting team having to sleep in a rather small 3 man tent. Subsequent to this collection the site of *Leucadendron orientale* has been burnt in the devastating fires that swept through the Eastern Cape in November of 2005. Plants are being propagated at Kirstenbosch Gardens for reintroduction.

In April 2005 a group of 8 horticulturalists from Kirstenbosch Gardens, including Carly Cowell and Louise Nurrish from the MSBP, undertook a trip to 'Die Hel' in the Grootwinterhoek Mountains. Alas on reaching the targeted site the plant *Ixianthes retsioides* had finished seeding. However all was not lost as another rare endemic was collected, as well as *Roridula dentata* – a rather odd looking and unique plant, which is now being grown for display at Kew Gardens.

June 2005 saw the MSB team along with the Ball Project team visit De Hoop Nature Reserve, a World Heritage Site and Flagship reserve for Cape Nature Conservation. Among the many species targeted in the reserve was *Protea aurea* subsp. *potbergensis*, only found on the Potberg Mountain and in fewer and fewer numbers. A whole day was spent traversing the Potberg, but this *Protea* remained elusive. We did however manage to lose Mr Adam Harrower, of the Ball Project, for a few hours, but did find and collect *Erica scytophylla*. After 3 days of searching and 21 collections, the field trip was over and returning to the camp as the last rays of sunlight touched the top of the Potberg, we spotted the Potberg *Protea*! In ever thickening darkness both teams raced up the sides of the mountain, collected bags of seed and cuttings and returned somewhat scratched and dirty, but triumphant to camp.

As winter released its wet grip of the Western Cape so the collectors of the MSBP and Kirstenbosch Gardens set out for the untamed Baviaanskloof in August of 2005 with the brand new MSBP vehicle, the Millennium Falcon. This Mega Reserve is so vast that the majority of it is unexplored and it was with relish that the teams set upon exploring their first kloof. With the agility of drunken monkeys they scaled the precipitous sides of the kloof to collect the endemic cedar, *Widdringtonia swartzii*, which as luck would have it only grows on near-vertical rock faces. Other gems that were collected from these rugged fold mountains included *Paranomus esterhuyseniae*, *Cotyledon*



orbiculata var. *orbiculata*, *Cannomois scirpoides* and *Leucadendron rourkei*.

Once spring had given winter the boot, it was time to start collecting the world renowned geophytes of the Cape. September 2005 offered a plethora of choices to the MSBP team with the small hamlet of Nieuwoudtville chosen for targeting. Staying in an old caravan under a tree teeming with weaver birds, from dawn to dusk, the geophytes of the Nieuwoudtville plains put on their best show for us. Stars of the stage were: *Sparaxis elegans*, *Hesperantha rivulicola*, *Gladiolus orchidiflorus*, *Geissorhiza splendidissima*, *Gladiolus watermeyerii*, *Romulea hirsuta* and *Lapeirousia jacquinii*. On returning to Cape Town, eyes still agog with fields of annuals and bulbs alike, the team stopped in Malmesbury for a little investigating. Finding many bulbous species in both flower and seed, we proceeded to collect what we could identify. One of these was guessed to be *Hesperantha sufflava*; however this could not be as it was thought to be extinct. Presuming to have mis-identified the species, the team returned to Kirstenbosch Gardens and asked for second opinions of the plant's true identity. To the joy of the team and many plant lovers it was confirmed that *Hesperantha sufflava* had indeed been re-found! Celebrations were cut short though when it was discovered that the site where the population was found was due for development. Luckily the MSBP has recently found and secured a secondary site where this species can be re-homed.

In late September 2005 a trip up the west coast of South Africa was undertaken with the destination being the De Beers Namaqualand Mining town of Kleinsee. With the coastal forests of the Garden Route but mere memories, the vast expanse of the Karoo opened its arms and heart to us. Succulents and annuals were the order of the day; collecting sites included rocky windswept beaches with ship wrecks and baking semi desert plains. Watching our lives flash before our eyes during a 4x4 drive over sand dunes and having goats, donkeys and one smelly leatherback turtle as our only company, plant collections soared, 33 in 3 days. Special mention must be given to *Aloe dichotoma*, *Lachenalia valeriae* and *Wooleya farinosa*.

October 2005 brought with it the third member of the current Cape team, Miss Olivia Pekeur. Olivia's first day included being bundled into the 'Millennium Falcon' and taken on her first collecting trip to the Boland mountains. Winter, in a last effort to have the final laugh, sent in a bitter cold front with rain and sleet. Regardless of the biting cold the team persevered and collected amongst others the vulnerable *Leucadendron elimense* subsp. *vyeboomense* and *Mimetes argenteus*. This whole area has been burnt in a devastating fire since then.

In the final two months of 2005 as the year started winding down, the collecting pace heated up. A return collecting trip was made to Nieuwoudtville to collect the seed of all those dazzling bulbs, 36 collections were made in



Top right: **Collecting in Eastern Cape – Louise Nurrish and Carly Cowell (MSB), with Trevor Adams in background (SANBI)**

Above left: **Collecting in the Kleinsee Reserve – Norma Jodamus (SANBI) and Roger Oliver (SANBI)**

Above right: **Collecting in the Boland mountains**

Story continues on page 3

Millennium Seed Bank Collection Trip: De Hoop Nature Reserve, January 2006



Far left: **Portrait of *Braunsia vanrensburgii* in De Hoop Nature Reserve, January 2006**

Left: **The collecting team (Carly Cowell, Louise Nurrish and Olivia Pekeur – the MSB team), and two Kirstenbosch horticulturists (Trevor Adams and Monique Twine) with *Lobelia valida* in front; January 2006**

Below: **Portrait of *Lobelia valida* with blue flowers in De Hoop Nature reserve, January 2006**

A collecting trip was made to De Hoop Nature Reserve from 16–19 January 2006. Our collecting team included the Millennium Seed Bank Team (Carly Cowell, Louise Nurrish & Olivia Pekeur), and two Kirstenbosch horticulturists (Trevor Adams & Monique Twine). Areas visited included Potberg, Vaalkrans, Hamerkop, Dronkvlei & Koppie Alleen. Nineteen seed collections were made, including some very interesting finds, two of which are detailed below.

Braunsia vanrensburgii (L.Bolus)

This dwarf succulent belongs to the family Aizoaceae and has visible woody stems. It is a **rare endemic** to the area, restricted to the Agulhas Plain. *Braunsia vanrensburgii* grows in shallow pockets of soil on limestone pavements. The waxy leaves are trigonous (three-angled), and margins are tinged with pink. Flowers are creamy yellow, and open at midday and close each afternoon. Flowering occurs from December to April. Seeds are produced in a 5-locular woody capsule. The population was scattered over an area of about 1 km² and contained a healthy range of young as well as mature flowering plants. No major threats to the population were identified. The Red Data List of Craig Hilton-Taylor (1996) lists the plant as Rare, but at the time of writing, the population had not been assessed for the new Red Listing.

Lobelia valida L.Bolus

This is another **rare endemic** last collected in De Hoop in the 1980s. Its distribution is limited to an area from De Hoop to Stilbaai. The common name is the 'Galjoenblom'. It is a small shrub growing to a height of 60cm and belongs to the family Campanulaceae. The showy flowers are about 15mm in size and deep blue with a white throat. Flowering occurs



from November to April. *Lobelia valida* grows on limestone in coastal hilly areas. We found only seven plants growing in sandy disturbed conditions. It was a cause for concern as the plants were growing beneath a washing line and could easily be brush cut or trodden on. We notified the Reserve Manager (Peter Chadwick), of the situation, and we are happy to report swift action was taken. The area has now been fenced off and the washing line moved. Hopefully the population will be able to re-establish itself as only mature plants were found. Hilton-Taylor (1996) lists *Lobelia valida* as indeterminate. The new Red List has not yet assessed this plant.

Other remarkable species collected included *Leucadendron muirii*, *Leucospermum truncatum*, *Pelargonium elegans*, and *Protea aurea* subsp. *potbergensis*.

An MOU has been signed between SANBI, the MSB and De Hoop Nature Reserve to facilitate information sharing and increase benefits for all partners. We plan to help train reserve staff on plant identification and collecting, and they in turn will help us with monitoring and finding new localities of plants.

We are indebted to Peter Chadwick for once again providing us with five star accommodation and much help to achieve the goals of our project.

Louise Nurrish

SANBI, Kirstenbosch National Botanic Garden, Cape Town, South Africa

Reference

Hilton-Taylor, C. (1996). Red data list of Southern African plants. *Strelitzia* 4

A Year with the MSB Cape Team *Continued from page 2*

total! Our last collecting month of 2005 saw the MSBP teamed up once again with the Horticulturalists from Kirstenbosch. The target area was the Cedarberg Mountains, well known for the *Widdringtonia cedarbergensis* and its high mountain peaks. Once again the Fates were not on our side as a bush fire was started the night we arrived and burnt a large portion of the area targeted for collection. A plan was made and other areas were visited resulting in 21 collections made and many cuttings being taken for the gardens.

A new year and new collecting areas then began in January 2006. First port of call was De Hoop Nature Reserve (see above). February 2006 saw a visit to the Tsitsikamma National Park by Louise and Olivia, as the MSB/SANBI had been asked to give comment on the forest area that is due to be removed for the widening of the N2 highway. Not being road surveyors or the like, recommendations made were a little different from those of the developers. But it was all good and many of the rarer plants will be saved and relocated to other areas in the park.

Although this was a brief summary of the year's collecting trips mention must be made of the numerous day trips made in and around the Cape Metropolitan area. On average only 2 days a week have been spent in the MSB offices at Kirstenbosch Gardens, the Millennium Falcon has taken us to veld type gems only a few minutes drive from the city centre. These have

been: Blaauwberg Conservation Area, Kenilworth Race Course (not for gambling), Milnerton Race Course, Silvermine, Cape Point and Table Mountain. Further a-field we have been to New Orleans (in Paarl that is), Du Toitskloof Pass, Franschhoek, Tulbagh, Klapmuts, Malmesbury and Darling. The list of threatened plants and habitats is endless, our job is a huge one but with the support of all our stakeholders and role players not to mention good colleagues with SANBI, we will make a difference.

Carly Cowell

SANBI, Kirstenbosch National Botanic Garden, Cape Town, South Africa

Reference

Hilton-Taylor, C. (1996). Red data list of Southern African plants. 117 p. *Strelitzia* vol. 4. National Botanical Institute, Pretoria.



Leucadendron orientale

A selection of international programme activities

Mali

Many of the vulnerable species of Mali are located in the buffer dry zones between the Sahara desert in the North and the remnant tropical humid forests in the South. The MSBP is supporting the country to collect and conserve seeds and data of collections of these Sudano-Sahelian wild species. The seeds are banked in Mali, interim storage is provided, *in trust* by Burkina Faso, and duplicate collections are kept at the MSB in the UK. The project is making a major contribution to meeting the objectives of the UN Convention to Combat Desertification (UNCCD), in a country experiencing serious drought and/or desertification. At the same time, this *ex-situ* conservation support is allowing Mali to meet objectives of the Global Strategy for Plant Conservation, in particular Targets 8 and 15. For the 2005–06 campaign, the project made 140 species collections, during either separate or joint expeditions, together with CNSF, Burkina Faso. In 2005, Sidi Sanogo started his PhD programme and recently visited the University of Gembloux, Belgium, to finalise his proposal. He is developing his research activities on the long-term conservation of Sahelian species, under the supervision of Prof. Patrick Van Damme (Gembloux) and Dr Moctar Sacande (RBG Kew). Sidi presented his preliminary work at the DIRECTS workshop on African seed science, held in Kumasi, Ghana. He will be carrying out part of these investigations in Mali, where they have now received additional laboratory equipment and he will continue to participate in the collection expeditions.

The Unité de Semences Forestières et d'Herbiers, Sikasso, which started with RBG Kew's contribution, is today an exemplary partnership between the Institut d'Economie Rurale (IER), Mali and the MSBP. The Seed Unit has been recently visited by the Malian Minister of Research and has won a prize at the national agronomic research week.

MSB joint collecting team (Burkina: Joseph Boussim, Mali-Sidi: Sanogo and RBG Kew: Michiel van Slageren) crossing the river Niger in Mali.



Botswana

The MSBP in Botswana, comprising four institutes in Botswana (National Plant Genetic Research Centre, National Herbarium & Botanical Garden, Veld Products Research & Development (VPRD) and the National Tree Seed Centre (NTSC)) has increased its success rate to about 90% this year. It is making a major contribution to meeting the objectives of the UN Convention to Combat Desertification (UNCCD), and at the same time it is meeting objectives of the Global Strategy for Plant Conservation, mainly Targets 8 and 15. On 31 March 2006, the project met its annual target for collections of new species duplicated at the MSB at Wakehurst Place. The challenge is now to ensure that these collecting targets continue to be met until the project ends in 2008.

During the 2005–06 collecting season six major expeditions took place, covering all 10 districts in the country. With the 142 collections made this year, the Botswana programme has reached a total of 325 collections since the start of the project, three years ago. A further 61 collections have been provided by Mr and Mrs Heath, volunteers for the project. To date, 18 Red Data List (41%) and 5 endemic (36%) species have been collected and a population Conservation Assessment Form completed for each of these listed species. VPRD have managed to locate 30 and collect 18 of their 40 utilitarian target species. Additionally another 130 herbarium collections were made to accompany the seed collections. Plants not previously reported for Botswana were occasionally found, for example, *Cyphostemma humile*, was discovered by the MSBP in two locations in the Southeast.



Unidentified Mesembryanthemaceae collected in Botswana

Georgia

Commencement of fieldwork collaboration in the Caucasus Biodiversity Hotspot

Georgia comprises the south-west, central and east parts of the Caucasus Biodiversity Hotspot. Its varied landscape ranges from the Black Sea coast, through semi-desert and volcanic soils, to Europe's highest peak (Mount Elbrus, 5642 m) in the Greater Caucasus range, which is reflected in a rich vascular flora of more than 4100 species. Endemicity ranks among the highest in the temperate world, with approximately 21% of its flora (900 species) being Georgian (300 species) or Caucasian (600 species) endemics.

A Memorandum of Collaboration was signed between RBG Kew and the Georgian Institute of Botany in September 2005, and the team have already made seed collections from over 100 species this year. Clare Trivedi and Damien Hicks joined fieldwork in



When appropriate, the project also collected live specimens for an *ex-situ* display collection at the National Botanical Gardens. All species collected are routinely photographed by the expedition team and the digital photo library currently contains ca. 460 images.

Capacity building and research activities are underway, in particular collecting and seed processing training, formal training and placements at RBG Kew. A two-day plant identification course was arranged in April 2005, led by Dr Iain Darbyshire from RBG Kew. This was a boost to the team who experience weaknesses in plant identification in the field. Informal training in botanical survey and inventory techniques was carried out by Dr Paul Smith, during a survey of the Orapa Game Farm, commissioned by Debswana. Investigations by Botswana partners include the impact of polluted environment on seed and seedling quality by Mrs Masego Kruger-Gaadingwe as part of her DPhil under the supervision of



August 2006, making over 30 seed and herbarium collections including 12 Caucasian endemics. Members of the Georgian team will visit the Millennium Seed Bank in early 2007 for seed germination training and discussion of workplans for 2007 and beyond.

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Staff from the Georgian Institute of Botany (Dr Marina Eristavi, Mrs Tsira Mikatadze-Pantsulaia, Dr Lia Kobakhidze) and RBG Kew (Mr Damien Hicks) conduct fieldwork on the Tskhratskaro Pass, Lesser Caucasus.

PHOTOGRAPHY: CLARE TRIVEDI



Botswana team in flash floods in the Mashatu region

Profs. Norman Pammenter and Pat Berjak (Department of Biological and Conservation Sciences, University of Kwa-Zulu-Natal (UKZN)), and Dr. Matt Daws (RBG Kew). Masego has been to the UKZN for a period of three and a half months and received a visit from her UKZN supervisors in January 2006. Masego presented her PhD work at the DIRECTS workshop on Africa seed science in Ghana. The NTSC is carrying out research on the seeds of two indigenous species, *Azanza garckena* and *Strychnos cocculoides* for desiccation tolerance and storage behaviour. Mr Kealeboga Kemoreile (Forestry Department) has subsequently received funding for a six-month research attachment at RBG Kew for further GIS and mapping techniques training, through the MSBP, starting from January 2006. Mrs Keodirile Gaebuse (NTSC) and Mr Thuso Phorabaeng (NPGRC) have participated in the 2006 Seed Conservation Techniques course at Wakehurst Place.

Australia

Australian Seed Collectors Meeting

An eventful first meeting of the Australian Millennium Seed Bank Partners – Seed Collectors was held at the Adelaide Botanic Gardens in early August, 2006. This is the first time that partners from the seven separate state/territory projects have got together to discuss seed collecting.

Each seed collecting team delivered presentations on the development of their state/territory programme. The objective of each presentation was to outline planning processes in relation to each state/territory conservation target and how they determined their current strategy for collections.

Seed collectors definitely feel as if they are the “workhorse” of the MSBP programme, so it was good to mutually recognise that. There was also the feeling that it was good to know that there are other people out there doing the same thing, dealing with the same issues, coping with the same conditions.

The Victorians and Tasmanians both recounted expeditions where seed collecting occurred in the snow. Whilst the other states and territory had stories of the other extreme, collecting in + 40°C with flies, snakes and scorpions.

Over the two-day workshop many of the main issues between states were resolved. The prime topic for discussion was the competition for species and the tight nature of collection targets. Between 10 and 20% of Australian species have ranges that cover two or more states. The partners amicably decided that more frequent and better communication between one another and MSB could avoid future collection duplication.



MSBP – Australian Seed Collectors

Left to right: **Andrew Crawford (WA), Micah Visoiu (Tas), Phil Boyle (Qld), Anne Cochrane (WA), Thai Te (SA), Bob Elkins (WA), James Wood (Tas), Luke Sweedman (WA), Jeff Jeanes (Vic), Mark Ochtman (WA), Richard Johnstone (NSW), Andrew Orme (NSW)**
Absent: **Katherine Baker (NT).**

Three steps they are looking to undertake are:

- Partners to provide spreadsheet (Excel) of material sent to their dry room with the intention to send it to MSB.
- Partners to provide spreadsheet (Excel) of material being sent to MSB immediately prior to sending.
- Regular and timely reports on species accessioned @ MSB via the SBD baseline.

Tasmania looked to be the state most affected by these issues, so it was decided to hold the next meeting of the Partners in Hobart in late July 2007. Already on the agenda for this meeting is: government and other funding strategies, Western Australia to run a training session on the Western Australian mapping system, revisit targets and competition and progression towards an Australian native seed association.

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Seed collecting in Canada

The Devonian Botanic Garden, Alberta, Canada contributes to the MSBP via the Donations Programme. During the 2005 collecting season Kit Strange from the Kew Alpine Unit joined the Canadian team, and in 2006 Beverly Maynard of the MSB Curation Section took part. Here Kit and Bev share their experiences.

2005 – Collecting in the Rockies, by Kit Strange

In the autumn of 2005 I was very lucky to join a seed-collecting expedition going to Kananaskis country, Alberta, Canada. The trip was organised through the MSBP, by two very enthusiastic individuals – Linda Hewlett and Barry Greig from the Devonian Botanic Garden.

The trip took us to alpine areas of the Kananaskis – which is in the eastern Rockies. I work in the Alpine Unit at Kew, and for me to visit the Canadian Rockies was hugely exciting. The main aim was seed collection for the MSBP, but if we did encounter other rare or endemic plants we would also note them, and take their GPS position for future reference.

The equipment for collecting was quite simple. Cloth bags (they do not disintegrate in the rain like paper bags do!), secateurs or scissors, tags for the bags, a sturdy notebook, and a reliable GPS. The other very important human equipment is several good pairs of eyes, and keen hands for finding and picking the seed. Finding plants in seed is not always that easy. In the field we used a great book, *'Plants of the Rocky Mountains'*, by Kershaw, MacKinnon, and Pojar for quick plant identification. Another really good guide is the *'Plants of Kananaskis Country, in the Rocky Mountains of Alberta'*, by Hallworth and Chinnappa which was brilliant for pinpointing locations.

We spent nine full days in the field. We hired a 4x4 and on our way down to our first base we even managed to visit a site – Wintergreen Ski Hill. There I saw the first plant that we grow in the Kew Alpine Unit – *Allium cernuum*, very exiting.

Our first base was Canmore. From here we went to sites which were mainly sub-alpine (1500-2000 meters). All the sites we visited were different from each other, in aspect, rock structure, moisture levels, and altitude. (Weather also played a part). Consequently we found different plants in every site.

All this new terrain, and plants was very exciting for me to experience. The nature in the Rockies is very wild and rugged, and that is not just because of the bears!! The Rocky Mountains is a very young mountain range, and all the



Above: **The team: Kit, Linda, Barry and Bob.**
Left: **Barry Greig harvesting *Pinus flexilis***
PHOTOGRAPHY: KIT STRANGE

mountains look very sharp and fresh. The plants

which occur are a strange mixture of really well known plants from this part of the northern hemisphere, and plants which I had never heard of or seen before!! So I must say that the plant diversity was a real eye opener. When you initially look at the mountain landscape, you do not expect to find much, but once you get up there, and start looking, things just start appearing.

The real highlight for me was to discover how many types of *Oxytropis* are found in North America. Unfortunately most of the seed falls out very quickly after they have flowered, but we got a few collections. I really enjoy their flowers. It is also a great genus for alpine house cultivation. Another plant which I could not stop photographing was *Cornus canadensis*. I love it as a woodlander, and for years I have been singing its praises for planting in a woodland situation. Suddenly to see it in the wild, was really great and inspiring.

All in all the trip was a great success, and we made over 70 collections. For me to discover plants we grow at Kew, growing in the wild, was a real buzz. Thank you.

2006 – Lakes and Prairies, by Beverly Maynard

As a follow-up to Kit's 2005 trip, I was fortunate enough to travel seed collecting in Southern Alberta in August 2006. Barry & Linda also organised this trip, with the addition of Bob Stadnyck, who has a very good eye for plant identification.

The areas we collected in were very different, from the Waterton Lakes National Park, southern Canadian Rockies in the west, across the wide

Story continues on page 7



Far left: **Wintergreen Ski Hill. On the slope behind the stream, we found *Allium cernuum*.**

Centre: **Subalpine meadow, with *Pinus contorta*, at Fortress Ski Hill.**

Left: **Bob trying to collect something in the snow.**

PHOTOGRAPHY: KIT STRANGE

Seed diagnostics and 'green chemistry'

The Royal Botanic Gardens, Kew are committed to enhancing the environmental management of both its gardens and laboratory operations. Staff are regularly reviewing ways to reduce the environmental impact of their work. Scientists at the Seed Conservation Department are now applying new tests for seed diagnostics, which have reduced the production of waste solvents. In an effort to identify new oilseed species for sustainable use, especially in Africa, seed fats are now extracted with small quantities of supercritical fluid carbon dioxide using a 'fat analyzer' rather than employing conventional methods of fat extraction with highly toxic organic solvents such as methanol and chloroform.

Supercritical fluid carbon dioxide is non-toxic, inexpensive and non-flammable. Its main applications are: dry cleaning, replacing perchloroethylene; caffeine extraction, replacing methylenechloride; and semiconductor manufacturing, replacing water that can damage the surface of silicon wafers. Such approaches reflect a growing global enthusiasm for waste reduction by the application of 'green chemistry' techniques, supported by academia, industry and government. Further reading: Gewin V. 2006. Chemistry's evolution. *Nature* 440, 378-379.

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Left: **Scientist Dr. Charlotte Seal using the 'fat analyzer'**. Funded by the **MSB Enhancement Grant**, Charlotte has recently joined the **Seed Conservation Department** and is currently specializing in the extraction of seed fats from species of sustainable use, including the **Cactaceae**.

Right: **Knowing the precise oil content of seeds is important for estimating seed longevity, which is a function of moisture content, oil content and species-specific viability constants. Seed oils also determine the nutritional and medicinal value of seeds. 'Shea butter', the oil extracted from the seed shown here, *Vitellaria paradoxa*, is used throughout Africa to protect and moisturize the skin.**

PHOTOGRAPHY: ELLY VAES.



RNA extraction from challenging seeds

The chemical composition of seeds is dominated by their reserves – carbohydrates, lipids and proteins – which is why seeds are the basis of human nutrition. Seeds also carry the genome of a whole plant, and studying their molecular traits is important for agricultural, medicinal and conservation purposes. However, molecular studies are often compromised by co-extracted substances that interfere with the analyte. For example, seeds are often rich in polyphenols, polysaccharides and lipids that interfere with, or degrade, RNA, restrict its yields and compromise its quality. Scientists at the Seed Conservation Department, Simona Birtič and Dr. Ilse Kranner, have now developed an easy, rapid method that addresses all of the above difficulties simultaneously, but avoids the use of toxic phenol-chloroform. The paper describes an improved, small-scale method for the isolation of significant amounts of high-quality RNA from minimal quantities of seed tissue.



The described protocol for RNA isolation from challenging plant material is applicable to seeds of plant species ranging from model plants and crops to wild herbs and trees. RNA molecule modified after www.als.ibl.gov/pics/79rnafig2.gif.

PHOTOGRAPHY AND DESIGN BY ELLY VAES.

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Birtič S. and Kranner I. 2006. Isolation of high-quality RNA from polyphenol, polysaccharide- and lipid-rich seeds. *Phytochemical Analysis* **17**: 144-148.

Seed collecting in Canada *Continued from page 6*

prairies of the Milk River area, to the rolling Cypress Hills Inter-provincial Park in the east, all parallel with the border to Montana, USA. We also experienced a wide range of weather conditions – cool autumnal mornings in the Rockies, rising to a high of 36°C on the prairies! Although the heat set off rain and thunderstorms, they were overnight so did not affect our collecting schedule. Over the eight days we made a good 37 collections, which we expect to be new species, ranging from a *Pinus* to a *Gentiana*.

The experience was unique for me, never having been to North America, but was made



extra special with the sighting of a year-old grizzly bear on the shores of Lower Waterton Lake, thankfully at a very safe distance, but close enough for a blurred but recognisable photo.

For further information on our collaboration with Devonian Botanic Garden, please contact:

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Clintonia uniflora PHOTOGRAPHY: BEVERLY MAYNARD

NEWS

New Seed Collector for MSB

Daisy Dent joined the MSBP as a seed collector in March 2006. She has already participated in seed collection trips in Malawi and the USA, and she has led a seed collection training programme in the Caribbean island of Montserrat. Prior to joining RBG Kew, Daisy completed a PhD in forest ecology, working with the University of Aberdeen in Sabah, Malaysia to identify the processes that maintain species diversity in the lowland rain forests of South-East Asia. She then went on to work with the Native Species Reforestation Project in Panama for two years, where she studied the potential for forest restoration on degraded farmland. Daisy is principally interested in rare plant conservation and habitat restoration. She will work mainly with MSBP partners in the Caribbean, Latin America and West Africa.

For more information, please contact:
Daisy Dent
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New Australian Coordinator for MSBP

After a long time in discussion a new position has been created in Australia for a Millennium Seed Bank Partners Coordinator. Tom North was successful in applying for the position and elected to work from Kings Park and Botanic Gardens, Perth. Tom comes from running a successful regional seed bank and revegetation service in the Murray catchment of Southern NSW.

The main priority for the MSBP – Australian Coordinator is to facilitate communication between the state/territory partnerships and promote an Australian identity. Over the past two months Tom, along with Tim Pearce, has visited every Australian partner. He has also had a couple of weeks' induction at the MSB during July of this year.

Also part of Tom's role is to engender a feeling of urgency in Australian funding bodies so that they understand how important the long-term strategy of ex-situ plant conservation is to insuring against plant extinction. With good planning this will ensure that there is a strategy in place so that the valuable work initiated by the MSB project in this decade continues into the next.

For more information, contact:

Tom North
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A message from Paul Smith

The Millennium Seed Bank Project (MSBP) is now halfway through the International Programme, and I will soon be writing to each of our MSBP partners in 18 countries to thank you for your recent efforts in helping us to meet the challenging targets we have set ourselves.

On 31 March the MSBP as a whole met its annual target for collections of new species duplicated at the MSB. This was especially important this year for a number of reasons. Firstly, it was important to demonstrate to our sponsors, the Millennium Commission, that the initial delays associated with the inception and development of

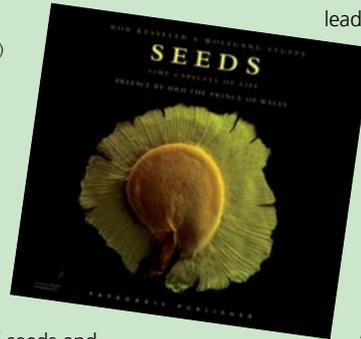
the country programmes were now over. Secondly, to maintain Millennium Commission funding which is dependent on conservation of new species at agreed rates. Thirdly, the Millennium Commission is due to hand over to its successor body, The Big Lottery, later this year, who will assume the role of monitoring and assessing this project – we wish to be seen as a successful project.

Our challenge now is to ensure that our targets continue to be met until the Project ends. This will not only ensure that we deliver what we promised, it will also significantly increase our chances of sourcing funding for future work together.

Seeds – Time Capsules of Life

by Rob Kessler and Wolfgang Stuppy
Papadakis Publisher, 264pp, £35. SBN 1901092666 (hb)

In collaboration with London-based artist Rob Kessler, the Millennium Seed Bank's seed morphologist Wolfgang Stuppy has just published a lavishly illustrated new book entitled "Seeds – Time Capsules of Life". Woven around the Millennium Seed Bank Project, This book presents a natural history of seeds illustrated with some of the most spectacular examples of seeds and fruits found in nature. The story begins with the evolution of seeds and their structure and discusses their dispersal through space and time, the latter finally



leading over to the Millennium Seed Bank Project which is featured in a separate chapter. Using seeds collected in the UK and many of the MSB partner countries, the highlight of the book are images taken with a scanning electron microscope (SEM) that have subsequently been artistically enhanced by Rob Kessler. For the first time ever, "Seeds – Time Capsules of Life"

reveals the minute and breathtaking detail of seeds to the public eye and presents their natural history before a scientifically sound background.

Sibidou Sina successfully defends PhD at Wageningen University, Netherlands

Parkia biglobosa (Jacq.) G. Don is one of the 34 known species of the genus *Parkia* whose centre of origin is South America. The species spreads throughout the African sudanian savannas, from Senegal to Uganda, and is an important socio-economic species in high demand by local communities for its multiple amenities and uses. However, the species remains under pressure from over-exploitation, leading to the degradation and lack of regeneration of *P. biglobosa* parklands in many zones.

Sibidou Sina investigated the reproductive biology of *P. biglobosa* and found out that the trees flower synchronously, with a weak parental relationship between those of the same population. However, the rate of intra-population gene exchange was an indication that the populations are similar enough to belong to the same genetic group. The long term conservation of its seeds,

stored in the Burkina Faso wild seed bank, revealed that although of orthodox type, these seeds can have short life span (<10 years) when they are not dried and handled properly. Sibidou then recommended a representative sample of 11 "ideal" populations in West Africa for the long term conservation of the species genetic resources. Separately, for Burkina Faso, 10 populations were selected, within each of which, collecting seeds from 15 individuals using a systematic sampling was sufficient to capture the maximum genetic variation.

Sibidou Sina stayed at the SCD/WTMB for six months in 2005 to write up his thesis, before successfully defending it publicly on the 8 March 2006 at Wageningen University.

For more information please contact:

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Millennium Seed Bank Collection Figures to 7 August 2006

	total in MSB	since Phase III started
Collections	30,103	18,643 (1,608 UK)
Species	16,070	11,533 (590 UK)



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

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