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## NEW FACT SHEETS ON INVASIVE ALIEN PLANTS AVAILABLE

Thanks to funding from Working for Water, ARC-PPRI's Weeds Programme is producing a series of fact sheets on invasive alien plants in South Africa and their biocontrol agents. The fact sheets are in full colour, in PDF format, and freely available for printing from the ARC website. A number of fact sheets have already been uploaded, and new ones will be added as they become available. If you'd like to access them, go to: <http://www.arc.agric.za/home.asp?pid=6979>

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## SOME MORE ON-LINE FACT SHEETS –THIS TIME ON THE ARACHNIDS

The African Arachnida Database (AFRAD) was developed to house information on all the arachnid species of the Afrotropical Region with taxonomic keys to orders, families, subfamilies, genera and species. Information richly illustrated with drawings and photographs can be downloaded as fact sheets (pamphlets) from the ARC website [www.arc.agric.za](http://www.arc.agric.za) see quick link AFRAD or <http://www.arc.agric.za/home.asp?pid=3235> AFRAD has provided a remarkable stimulus to Arachnid research in Africa since the launch of the project.

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## Biosystematics

### Some spider species at risk of extinction in Eastern Cape

The Pondoland region of the Eastern Cape Province, South Africa, is very poorly studied with regard to invertebrate diversity, particularly in the case of arachnids. Accordingly, and in view of proposed infrastructural and mining developments in this ecologically sensitive area of high plant endemism, baseline data were obtained of spiders (Araneae) of the vegetation layer (i.e. excluding the ground-dwelling fauna) of the Mkambati Nature Reserve (MNR). Spiders were collected at 26 sites (6 forest and 20 grassland sites) in the MNR using sweep sampling, active searching of flowers in grassland, and tree beating in forests, all part of a broader biodiversity survey. Additional specimens were collected with Malaise and pan traps. A total of 1275 specimens were sampled, representing 132 species (6.6% of the total number recorded in South Africa) in 103 genera and 29 families. All 132 species are new records for the reserve, of which 20 were new records for the Eastern Cape, and at least eight spider species may be new to science. The spider diversity captured, despite temporal and methodological limits, indicates that many additional species are likely to occur in the reserve. Conservation implications are that, if the MNR is not adequately conserved, at least five new species, which may be confined to the area, would be at high risk of extinction, and 15 other species, endemic to the Pondoland and KwaZulu-Natal region, would be at risk of extinction.

#### FURTHER READING

DIPPENAAR-SCHOEMAN A.S., HAMER M. & HADDAD C.R. 2011. Spiders (Arachnida: Araneae) of the vegetation layer of the Mkambati Nature Reserve, Eastern Cape, South Africa. *Koedoe* 53 (1): 10pp.

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Araneidae *Neoscona blondeli* (hairy field spider) - the most abundant web-dwelling species sampled

### IMPACT OF AN INVASIVE WEED ON SPIDERS IN THE KRUGER NATIONAL PARK

A team of researchers from the Universities of Pretoria, Rhodes and Stellenbosch, the South African National Parks, Ditsong Museum of Natural History and the Spider Unit at the ARC-Plant Protection Research Institute investigated the effect of the invasive prickly pear (*Opuntia stricta*) on beetle and spider species assemblages in the Skukuza region of the Kruger National Park (KNP). Both globally and in South Africa, the impacts of invasive species, especially plants, on invertebrate diversity are still poorly understood. It is important to quantify these impacts because invertebrates make a large contribution to global species diversity and are important in regulating many fundamental processes in biomes throughout the world. There is a paucity of studies examining direct impacts of introduced alien plant species on biodiversity, a key need for motivating for alien species control in conservation areas.

The only other study, looking at the effect of the weed *Chromolaena odorata* on spiders, was undertaken in the Hluhluwe Nature Reserve in 2008. Within the KNP, which is considered the flagship reserve in South Africa's protected area network, invasive alien plants have been identified as one of the most pressing threats to biodiversity, with *Opuntia stricta* invading some 35 000 ha of KNP. Unbaited pitfall traps were used over a 12-month period in four treatments of varying *O. stricta* density. Species richness, species density and abundance of beetles and spiders were compared. A total of 128 spider species (1051 individuals) were collected. Species richness and species density for beetles and spiders did not differ significantly across the four treatments. Assemblages for spiders did not differ across treatments, but beetle assemblages were significantly different from uninhabited control sites. This study suggests that the current density of *O. stricta* does not significantly affect spider species richness, density or assemblages but that beetle assemblages are significantly affected. Spider voucher specimens are housed in the National Collection of Arachnida at the ARC-Plant Protection, Research Institute.

#### FURTHER READING

ROBERTSON M.P., HARRIS K.R., COETZEE J.A., FOX-CROFT L.C., DIPPENAAR-SCHOEMAN A.S. & VAN RENSBURG B.J., 2011. Assessing local scale impacts of *Opuntia stricta* (Cactaceae) invasion on beetle and spider diversity in Kruger National Park, South Africa. *African Zoology* 46: 205-223.

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Wolf spiders are a dominant group in the KNP represented by 7 species

## Biosystematics (continued)

### The association of *Tarsonemus* mites with apples and apple core rot diseases

*Tarsonemus* mites are common in nature and have been collected from many plant species, fungi, leaf litter, soil, and stored food products. The genus *Tarsonemus* belongs to the family Tarsonemidae, subfamily Tarsoneminae, and contains more than 200 described species. The majority of species within the genus are considered to be fungivorous. However, some species occasionally occur as minor pests in greenhouses where they can cause damage to plants. The fungivorous nature of *Tarsonemus* mites creates the potential for the vectoring of fungi, and they can therefore play a role in fungal dispersal and ecology. *Tarsonemus* mites may also play a role in core rot diseases of apples. A preliminary study in California, USA, provided some support for the role of *Tarsonemus* mites in the epidemiology of core rot diseases, specifically dry core rot. However information on the role of *Tarsonemus* mites in the epidemiology of apple core rots (wet and dry) is limited.

A study by a team from the University of Stellenbosch, the ARC and Oregon State University was recently undertaken in four orchards in Ceres in the Western Cape on two core-rot-susceptible (Red Delicious) and two core-rot-resistant (Granny Smith) apple orchards. The aim was to assess the effect of different apple developmental stages on the relative abundance of *Tarsonemus* mites, and to determine if there is a tendency for these mites to be associated with wet core rot (WCR) and dry core rot (DCR) apples, and to evaluate the suitability of three core-rot-associated fungal genera as food sources for the mites.

Surveys revealed that *Tarsonemus* was the dominant mite genus in all the apple developmental stages in all orchards. The mites had the highest incidence in mature fruits and mummies in all the orchards. In the cores of healthy and DCR Red Delicious fruits, *Tarsonemus* mites had a high occurrence of 56% and 84%, respectively. In these fruits, a significant association was found between DCR and the presence of mites in the core. In contrast, in Granny Smith fruits, mites were restricted to the calyx tubes, and only a calyx tube decay symptom was identified. The *Tarsonemus* mites found were fungivorous and reproduced on cultures of a *Cladosporium* sp. Cultures of *Alternaria* sp. and *Penicillium* sp. were unsuitable for mite reproduction, even though the mites did ingest a red fluorescently labeled *Alternaria* sp. culture.

In South Africa, the *Tarsonemus* mites present in apple orchards may consist of three species, including *T. waitei* and two putative new species with closest similarity to *T. mixtus* and *T. bilobatus*, respectively. This study provides preliminary evidence for a possible role of *Tarsonemus* mites in the epidemiology of apple core rot diseases. It will be important in future studies to conduct inoculation studies to determine if co-inoculation of core rot pathogenic fungi and *Tarsonemus* mites can increase disease incidence and severity.



#### Further reading

Van der Walt, L., Spotts R.A., Ueckermann E.A., Smit F J, Jensen T & McLeod A. 2011. The association of *Tarsonemus* mites (Acari: Heterostigmata) with different apple developmental stages and apple core rot diseases. *International Journal of Acarology*, 37:sup1, 71-84.

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### What plants do bees pollinate?



A metallic gold halictid bee gathering pollen

Not every bee is a pollinator. Most bees seek floral resources, pollen and nectar, for their own use. A few may use flowers only for shelter. Some bees contribute to pollination while others simply rob the flowers and do not contribute to the plant's well-being. Pollination is difficult to study because one has to identify whether the bee is gathering pollen, which is sometimes deep in the corolla tube and out of sight. Some visits are very short. As bees must carry pollen from one flower to another in order to achieve pollination, the first step is to identify its pollen load. Determining species of pollen by means of morphological features is a very specialized field, and the experts who can do this are scarce. For this reason, ARC-PPRI and the Biotechnology Platform of the ARC have initiated a joint project, financed by ARC and the National Research Foundation, to generate DNA barcodes for the pollen loads of bees present in the ARC's bee collection. DNA barcoding is a new technology that enables the identification of species using a small part of the DNA code. This project will be undertaken by a PhD student who will be supervised by C. Eardley, J. Kelly and D. Swanevelder, all of whom are ARC staff members.

This project will provide a wealth of information and will add value to the existing collection. In years to come it will enable researchers to map pollination throughout the country. This will *inter alia* benefit agriculture, biodiversity conservation and the documentation of changes in vegetation due to land use and climate change. The current project prepares the way towards using new technology to answer old questions that could not be answered satisfactorily before. As the technology improves efficiency, it will enable researchers to increase the scope of pollination studies from the species level to the ecosystem level.

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## *Biosystematics (continued)*

### **South Africa Bee Biodiversity Survey (SABBS) visits New Orleans**

Dr Janine Kelly attended the Taxonomic Databases Working Group (TDWG)'s congress "Biodiversity Information Standards" which was held in New Orleans, USA, from 17 – 23 September 2011.

The bee taxonomic and specimen database at Biosystematics is a vital part of the South Africa Bee Biodiversity Survey (SABBS), a project that was started last year. The database has seen a few large changes recently. The most significant change has been the software migration from the programme MS Access, over to Specify6, which is custom-designed for biological collection data. The timing and opportunity to attend a congress on data standards was fortunate. It allowed us to compare our current and new databasing standards and ideas with those of researchers from other parts of the world. It was encouraging to learn that we are well within current world standards. In fact, the level at which we database is one of the best in the world.

The variety of different things that have been or are currently being databased includes anything from stars, to weather from the early explorer ship logs. This is done on all scales on various projects all over the world.

Databasing has been going for a long time now, and along the way, researchers have come up with innovative ideas on how to database, and how to involve as many people as possible.

#### **The take-home messages from New Orleans were:**

1. There are as many different databases as there are types of data! However, the people who are currently working on the development of Specify6 were also at the congress. We were able to discuss Specify's bright future, and we will be contributing to its further development and growth.
2. There is still a drive to digitise biological data, botanical and zoological specimen data in various institutions from all over the world. This has been and still is at every level, from photographic records of entire drawers of material, to the databasing of individual specimens as we do at Biosystematics.
3. Geo-referencing and the rapid development of tools and skills in this part of digitizing biological data is also still receiving good support. There are also a few projects to develop programmes to map geo-referenced specimens.
4. There is also support for Citizen Science and its role in the digitization of data. This approach has been successfully used in various projects over the past few years. The focus now is to attract people to the biological world. The Australians have had good success using volunteers as well as Citizen Science for the digitization of biological information.
5. Don't delay – get databasing!

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Connal Eardley, Temitope Kehinde and Janine Kelly during Temitope's visit to Biosystematics



### **Nigerian visitor interested in bees**

Temitope Kehinde visited the Biosystematics Division in November on his way home to Nigeria after completing his PhD degree at the University of Stellenbosch. His thesis was on a comparative study of bee biodiversity in natural areas and vineyards in the Western Cape Province. In Nigeria, Temitope will continue to study bee biodiversity. He is also interested in pollination biology. However, because the bees of Nigeria are poorly known, he also plans to build up a collection of these insects, which will be imperative for his research. The purpose of his visit to Biosystematics was to learn more about identifying bee families and genera. His interest in bees and pollination has expanded into the ever growing Africa-wide network of bee taxonomists and pollination biologists to Nigeria. We look forward to working with him in the years to come.

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## *Biosystematics (continued)*

### IMPORTANT CONTRIBUTION BY VISITING RUSSIAN ARACHNOLOGIST

As part of a bilateral agreement between South Africa and Russia, Dr Galina Azarkina visited South Africa from October to December, to study the jumping spiders, which belong to the family Salticidae. Salticids are often the most diverse and abundant spider group found in surveys throughout South Africa. Her study will show the significance of this major spider taxon and contribute to our knowledge of South African jumping spiders, and resolving the relationships of South African salticids with other jumping spider faunas of Africa and the world. The completion of this study would, for the first time, provide a framework for conservation assessments (Red Data listing) of salticids in South Africa.

The aim of this project is to describe, differentially diagnose, illustrate, and characterise phylogenetically the genera and species of the South African salticid fauna and to summarize their biogeography. Two methodological approaches are being used:

1. Morphological methods: the study of all material, type and other, kept in the collections; description, drawing of copulatory organs, creating digital images of important taxonomical characters.
2. Molecular methods: DNA barcoding, which will require the collection of fresh specimens into absolute alcohol, laboratory analysis and comparison with phylogenies based on morphological characters.

Anticipated outputs include taxonomic papers (revisions) with descriptions of new species, taxonomic keys, papers on DNA barcoding and South African salticid phylogeny, estimating the richness of the South African fauna, conservation assessments, and digital collection contributions.

While Galina was in South Africa, she spent most of her time at Biosystematics in Pretoria and the University of Venda. She worked mainly on the specimens housed in the National Collection of Arachnida (NCA). The NCA has a very large number of specimens sampled during the South African National Surveys of Arachnida (SANSA). She worked through > 2000 samples and identified more than 200 salticid species from South Africa, of which 60 are new to science.

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Dr Galina Azarkina

### ***Mycology presents Introductory Molecular Biology short courses***

Two short courses on basic molecular biology, developed by Dr. Riana Jacobs-Venter, were presented by the Mycology Unit at PPRI Roodeplaat. The Introductory Cell Biology Course was held during 17-18 October, and was attended by 9 participants, while the Introductory Molecular Biology Course was presented to 10 participants during 19-21 October 2011. The course attendees came from various ARC institutes, National Department of Agriculture, Forestry and Fisheries and biotechnology companies.

The Introductory Cell Biology course gave an introduction to the biology of eukaryote cells, focusing on cell structures, organelles, DNA and cell processes such as mitosis, meiosis and DNA replication. The participants performed practical exercises in DNA extraction, polymerase chain reactions and gel electrophoresis. The Introductory Molecular Biology course covered a basic introduction to various methods used in molecular biology and phylogenetic research, including molecular markers, recombinant DNA techniques, evolutionary change, phylogenetic analyses and DNA Barcoding. The last day of the course was spent at the ARC-Central Office, where the participants performed practical exercises in phylogenetic analysis.

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Course participants of the Introductory Molecular Biology Course



Course participants of the Introductory Cell Biology Course

## *Insect Ecology*

# The secretive cabbage pest

Recently, the Insect Ecology Programme was approached by small holder farmers in Dennilton, Limpopo Province, to investigate the cause of their cabbage crops simply dying off. On arrival, we established that the outside leaves of the cabbage crop were wilted and dry.



Dry and wilted outer cabbage leaves

Further inspection of several cabbage heads revealed that the crop was infested by larvae of cabbage webworm *Hellula undalis*.



*Hellula undalis* (Fabricius) larvae

The reason that the farmers only saw the symptoms of *H. undalis* infestations so late is due to the secretive feeding behaviour of the pest. On hatching, the neonates mine the leaves, but they soon outgrow the mines and start feeding on the leaf surface. In the process, they form a web around them that binds the outer and inner leaves together; hence the name cabbage webworm.

As the larvae grow older, they tunnel into larger veins, and then the midrib, as they make their way into the stem. On completion of their larval development, they pupate in the soil. Depending on severity of the infestations, the plant becomes top-heavy and it falls over.



Damaged cabbage stem by *H. undalis* which causes the plant to fall over

Due to its secretive habits, the early detection of the presence of the pest in the crop environment is essential. In this regard synthetic sex pheromones are an ideal tool to use. Once pest presence is confirmed in pheromone traps, crop scouting is encouraged to determine infestation levels and their distribution on the crop. If few plants are infested, then spot spraying using a systemic insecticide will be encouraged. However, it needs to be borne in mind that *H. undalis* is part of an insect pest complex on Brassica crops. For instance, while *H. undalis* is a sporadic pest occurring during summer to autumn (December – April), this period coincided with lower diamondback moth (DBM) populations due to high parasitism levels. Thus, insecticide applications against *H. undalis* are likely to interfere with natural control of DBM by parasitoids. Our preliminary investigations have uncovered two parasitoid species on *H. undalis* whose identity is yet to be confirmed. Further work will concentrate on determining the impact of these parasitoids on their host populations in order to develop a biological control-based IPM for this pest.

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Farmer Thomas Mkhabela with healthy cabbages

## *Pesticide Science*

### **UNCCD Multi-National Conclusion Workshop, South Korea**

Ms Lianda Lotter (seconded to ARC-ISCW: Land Degradation Assessment in Drylands (LADA) project) attended the Multi-National Inception Workshop held in Mexico in July 2011, which started the Pilot Impact Indicator Tracking Exercise. The principal objective of the Inception Workshop was to obtain a collective understanding of the United Nations Convention to Combat Desertification (UNCCD) Impact Indicators in monitoring and reporting on desertification, land degradation and drought (DLDD) in affected countries. Participants from eleven countries were invited. The participants also included representatives from five synergistic initiatives, namely, the Convention on Biological Diversity (CBD), the Scientific and Technical Advisory Panel of the Global Environmental Facility (GEF-STAP), the Global Mechanism (GM), the Land Degradation Assessment in Drylands (LADA) project, and ECLAC-Chile, in its capacity as a PRAIS (Performance Review and Assessment of the Implementation System) Reference Centre. This Workshop was followed by a two-month period during which the various countries (South Africa, Armenia, China, Colombia, Senegal, and Tunisia) produced and reported on the UNCCD Impact Indicators.



Country representatives at the Multi-National Inception Workshop (Mexico, 11-13 July 2011)

Ms Lotter then attended the Multi-National Conclusion Workshop of the UN Convention to Combat Desertification Pilot Impact Indicators Tracking Exercise in Changwon, Republic of Korea, from 6-7 October 2011. The Conclusions Workshop was used as a platform for the participants to share their national experiences of activities undertaken and experiences gained and to report on the successes and challenges, during the pilot of the impact indicators exercise.

The objectives of the workshop were to 1) assess the feasibility of producing and reporting on the UNCCD impact indicators, 2) assess the indicators as a set to identify gaps, overlap and interpretation, 3) assess how applicable the UNCCD impact indicators are to national priorities, and 4) integrate lessons learnt and develop key messages for reporting at the tenth meeting of Conference of Parties to the UN Convention to Combat Desertification (UNCCD COP10).



Country representatives at the Multi-National Conclusion Workshop (Changwon, Korea, 6-7 October 2011)

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## *Plant Pathology and Microbiology*

### **Soil Microbiology Lab reaches record number of analyses**

Microorganisms play a very important role in nutrient cycling as a fundamental soil function. Soil Microbiology is the study of soil microorganisms' functions, and the effect of their activities on soil characteristics and the subsequent effect on the growth and health of plant life. Modern soil microbiology is characterised by the integration of microbiology with concepts of soil science, chemistry and ecology in order to gain better understanding of microbial functioning in the soil environment.

The Soil Microbiology Laboratory (SML) at ARC-PPRI, Roodeplaat, investigates soil microbial community level physiological profiles and enzymatic activity assays to determine the microbial functional diversity and -activity changes under different agricultural management practices. Enzyme activities are early indicators of stress in a specific ecosystem. In this context, they can act as early biological indicators of soil health and quality by describing the functioning of a soil ecosystem. Thus they provide useful information on the diversity and activity of soil microbial populations contributing to healthy ecosystem dynamics.

Apart from the incorporation of these recognized methodologies in collaborative soil microbiology projects since 2005, these analytical services were also rendered to clients. The number of satisfied clients utilising this service steadily increased over the years. Several clients, currently involved in projects to determine the long-term effects of soil management practices on soil biological properties, regularly send batches of soil samples to be analysed at the SML.

The need for these services is illustrated by the record-breaking number of samples processed during the 2011/2012 season. An internal evaluation revealed that, by 31 December 2011, 1524 analyses had been performed, whereas 1720 analyses still need to be completed by the end of March 2012. By that time, it is estimated that an astounding total of 3244 analyses would be completed. This is truly a remarkable achievement, considering the increase of more than 340% in processed soil samples since the 2010/2011 season.

A very special word of gratitude to all our clients – and to all of the hard-working personnel at the Soil Microbiology Laboratory who made this achievement possible.

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Johan with a few minutes to spare during soil microbial activity assays in progress



A close-up illustrating the colorimetric changes during soil microbial activity assays

### **ZZ2 Laboratories Soil Health Workshop 2011**

Farmers' and the community's needs are met by the ability of agricultural soils to balance a range of functions. Healthy soils function to sustain soil and plant life, water and nutrient cycling, decomposition of organic matter, inactivation of toxic compounds, protection of water quality and pathogen suppression. When interactions amongst internal soil components are optimal and interactions with its external environment and the production systems are sustainable, it implies that soil functions as a balanced living system.

ZZ2, a world leader in tomato production and large-scale biological farming practices, acknowledges the importance of soil health as an integral part of successful farming. The ZZ2 Laboratories invited 27 experts in this field, to participate in a Soil Health Workshop in Polokwane during September 2011. Topics discussed during this multi-disciplinary forum were: "Towards developing and implementing soil health", "Addressing soil health constraints", "Developing a roadmap for establishing a soil health system", and finally "Soil health, sustainability and yield". Prof Harold van Es, a soil health expert from Cornell University, Dr Sandra Lamprecht (PPRI Vredenburg), and Mr Johan Habig (PPRI Roodeplaat) took part in brainstorming sessions aiming to produce a conceptual framework for the development and implementation of a soil health system at the grower level.

During this workshop, Mr Habig also presented a talk: "Using Biolog EcoPlate and soil enzyme activity as Soil Health Indicators". It was concluded that soil microbial interactions with the soil environment may never be fully understood due to its immense complexity. Current knowledge, however, unmistakably indicates the important role soil biota play in nutrient cycling and soil structure improvement for healthier soils.

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(group photograph next page)

## *Plant Pathology and Microbiology (continued)*



Participants at the ZZ2 Laboratory Soil Health Workshop held in Polokwane during September 2011

### **Soil Microbiology employee visits Western Cape**

During 2007, the Western Cape Department of Agriculture and ARC-PPRI's Soil Microbiology Laboratory (SML) embarked on a collaborative project to monitor soil health at the Department's selected experimental farms. The trials consisted of specific crop sequences and tillage management combinations from year 1 to year 4 in a four-year cycle, with 2007 being the first year of the cycle. During August / September 2011, the last year in the cycle, 224 soil samples were collected from plots of seven crop sequences at the Soil Health Trials at both Langgewens and Tygerhoek Experimental Farms located at Malmesbury and Riviersonderend, respectively. The data from this first sampling was used as the baseline data for future comparison with follow-up samplings. Since these trials are a continuation of the same crop sequences followed for more than 4 seasons prior to 2007, data from this study could be used to examine short-term effects of crop sequence and tillage practices on soil microbial diversity and enzymatic activity.

This collaborative project also presented one of Soil Microbiology's most dedicated employees the opportunity of a lifetime to experience the Western Cape.

Ms Selina Makgetlaneng (59 years young) has never had the opportunity to fly in an aeroplane, sleep in a guesthouse, experience the ocean's splendour, or see the beautiful Cape Mountains. Despite a gruelling fieldwork-schedule under typical Western Cape weather conditions, and long hours in PPRI Vredenburg's labs to get all the collected soil samples processed in time, Selina had the opportunity to experience fresh "fish and chips" on the beach at Gordon's Bay, as well as the breath-taking mountain-scenery along the road to the various trial sites.

Even though Selina was completely overwhelmed by the fieldtrip, there was yet one aspect of the Cape she could not comprehend: "Johan, eishh, what do these people eat if there is no 'pap'!?"

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Phase 1 - 224 soil samples successfully sampled.



Phase 2 – Selina processing soil samples for delivery to SML in Pretoria

## *Weeds Research*

### ***A helping hand for biological control in the Western Cape***

During 2011, the *Working for Water* (WfW) Programme and Cape Nature collaborated with ARC-PPRI to address the shortage of suitably trained people to harvest biological control agents from areas where they are already established in order to translocate to areas in which agents are urgently required.

Staff from the ARC-PPRI Weeds Research Programme at Vredenburg, Stellenbosch, responsible for the biological control of weeds by means of insect natural enemies, helped to train two teams of WfW employees in collecting and monitoring biological control agents on weeds of Australian origin that have become invasive in the Western Cape Province. The two teams, each comprised of seven people from the Grabouw and George areas, were sent to Stellenbosch, where they were accommodated in tents on Cape Nature property in the Jonkershoek valley. Although some members from both teams had been previously employed within WfW, for others it was a new concept, and none of the individuals had any prior knowledge of, nor training in biological control.

The teams were given an introductory lecture to the biological control of weeds, after which they received instruction in the identification of the important local weeds of Australian origin, including various *Acacia* species, *Hakea sericea*, *Hakea gibbosa* and *Leptospermum laevigatum* (Australian myrtle), as well as how to recognise and collect their respective biocontrol agents.

Following this, the trainees were plunged into the task of field-collecting *Melanterius* seed weevils from several of the Australian *Acacia* species, for future re-distribution to areas where biocontrol agents are needed. The focus for the collecting was on *Acacia mearnsii* (black wattle) and *Acacia saligna* (Port Jackson willow), both of which are widespread weeds with a high demand for biocontrol agents. However, weevils were also collected from *Acacia melanoxylon* (Australian blackwood) and *Acacia dealbata* (silver wattle).

Under the supervision of respective team leaders and technical staff from the Weeds Research Programme, the groups spent approximately 6 weeks out in the field, where they demonstrated tremendous enthusiasm for the job at hand, sometimes under quite trying conditions. The result of their labours was a collection of almost 80 000 weevils – a tremendous accomplishment and true testimony to their hard work and dedication. The weevils were subsequently re-distributed to numerous sites across the country, including areas in the southern Cape, the Eastern Cape, Kwa-Zulu-Natal, and Mpumalanga.

Both teams have now been assigned a dedicated role within WfW as biocontrol implementers, and in future they will also be involved with collecting agents for *Hakea* species and Australian myrtle. In addition to this they have become involved in a biocontrol monitoring programme, which will record the presence (or absence) of biocontrol agents on relevant weeds throughout most of the Western Cape.

We look forward to future collaboration with both teams, and to ultimately seeing the benefits of their labours.

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The combined team from George and Grabouw



Team members examining hakea fruit capsules for the presence of seed moths

## *Weeds Research (continued)*

### YEBO GOGGA EXHIBITION

Every year the University of the Witwatersrand hosts a number of conservation organisations and biodiversity awareness groups at their annual 'Yebo Gogga' exhibition, which is held on the University grounds in Johannesburg. In previous years, the show was used primarily to showcase the research being done at the University's School of Animal, Plant and Environmental Sciences, and in so doing, attempted to stimulate interest from scholars, students and the general public on everything from current environmental issues, down to all manner of creepy crawlies. More recently the show has grown and encompasses not only displays from the university, but also from other groups such as the Johannesburg Zoo, Water Wise, The Spider Club of South Africa, SANBI, Free Me, and Rand Water. In October 2011, the Weeds Research Programme staff at Rietondale became involved in the show in order to promote awareness on the problems associated with invasive alien plants, as well as to exhibit some of the biocontrol research that has been undertaken in South Africa. The Programme's display encompassed many of Gauteng's common invasive weeds, and also included examples from numerous biological control programs, both past and present. The live insects on display were especially well received: the stand was visited by almost 6000 people over the five days of the exhibition.

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Hand-made models of some of the biocontrol agents attracted attention and highlighted the beauty of the insects



Showcasing the biological control of *Lantana camara*



Visitors to the Weeds Research exhibit

## *Weeds Research (continued)*

### Discovery of elusive test plant species allows research to be wrapped up

Madeira vine, *Anredera cordifolia* (Ten.) Steenis subsp. *cordifolia* (Basellaceae), is native to South America but has become invasive and problematic in many countries, including South Africa. Weedy vines are notoriously difficult to control through conventional mechanical and chemical means, so research into the biological control of *A. cordifolia* in South Africa was initiated in 2003.

Two leaf-feeding beetles, *Phenrica* sp. (Coleoptera: Chrysomelidae) from Brazil and *Plectonycha correntina* Lacordaire (Coleoptera: Chrysomelidae: Chrysomelinae) from Argentina and Brazil, were imported into the quarantine facilities at ARC-PPRI in Pretoria. Adults and larvae of both chrysomelids feed extensively on leaves and new growth of *A. cordifolia*, resulting in leaf and above-ground biomass reductions. Although the *Phenrica* sp. colony died out and recollection has not been possible, host-specificity studies are continuing on *P. correntina*. So far, normal development has been restricted to the target plant and the laboratory host-range of this potential agent seems acceptably narrow, despite some feeding on other non-indigenous species within the family Basellaceae and other closely related families. Completion of the host-range trials was put on ice, however, due to difficulty in getting hold of any specimens of another plant species that needs to be included. In order to comply with international protocols and DAFF (Department of Agriculture, Forestry and Fisheries) requirements, *Basella paniculata* Volkens, the only South African member of the Basellaceae, still needs to be evaluated to determine its host potential for *P. correntina*.

*Basella paniculata*, a perennial, succulent climber, is endemic to eastern and southern Africa and has a marginal distribution in the Limpopo Province as well as northern KwaZulu-Natal at altitudes ranging from 30-100m. Over the past four years numerous attempts have been made to find and collect *B. paniculata* in the KZN thickets amongst other climbers and creepers. This proved to be very difficult as it is leafless for extended periods, and only slightly more visible when bearing fleshy, pink to dark purple fruit from November to mid-December.

In October 2011, Dr. S. Naser (ARC-PPRI, now retired) eventually managed to locate *B. paniculata* near the Ndumu Game Reserve in northern KZN. Plant material was collected for propagation as well as for herbarium specimens. The discovery has revived interest in the project and, pending the outcome of the host-specificity evaluation of *B. paniculata*, a release application for *P. correntina* will be prepared and submitted to DAFF.

With no indigenous Basellaceae, Australia has made their first release of the insect in early 2011 after the Queensland's Department of Employment, Economic Development and Innovation (DEEDI) obtained a *P. correntina* culture from ARC-PPRI in 2008. It has been reported that the insects have successfully overwintered and established, and further releases are planned for Queensland and New South Wales. The prospects for future establishment in South Africa are therefore promising.

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Dr. Stefan Naser collecting *Basella paniculata*



*Basella paniculata* leaves and unripe fruit

## Technology Transfer

### Scientific publications

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### Chapters in book

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## Technology Transfer

### Pamphlets

BESAANS L.C., 2011. Queen of the night cactus. *Cereus jamacaru*. Pamphlet

BESAANS L.C., 2012. *Hypogeococcus pungens*. A mealybug released for biocontrol of queen of the night cactus. Pamphlet.

BESAANS L.C., 2011. *Nealcidion cereicola*. A longhorn beetle released for biocontrol of harrisia cactus. Pamphlet.

BESAANS L.C., 2012. *Nealcidion cereicola*. A longhorn beetle released for biocontrol of queen of the night cactus. Pamphlet.

BESAANS L.C., 2012. Harrisia cactus. *Harrisia martinii*. Pamphlet.

### Newsletters

DIPPENAAR-SCHOEMAN A.S. & HADDAD, C, SANSA  
News No. 15, December 2011

HENDERSON L. SAPIA News No. 21, October 2011

HENDERSON L. SAPIA News No. 22, November 2011

### Radio talks

- Mike Allsopp gave a radio talk on Channel 702, 1 December 2011.
- Ansie Dippenaar-Schoeman continued with her radio talks on Radio Laeveld (10 were broadcast).

## ARC-PPRI Media Networking Session



On 27 October 2011, the ARC-Plant Protection Research Institute (ARC-PPRI) held a Media Networking Session at the Biosystematics Building, to build and maintain a good working relationship with the media. Media is a channel through which the ARC conveys its messages and promotes its services to other stakeholders.

The objective of the media networking session, amongst others, was to build a positive image of the ARC, particularly PPRI, and educate the media about ARC-PPRI's role and expertise. The media were given the opportunity to meet some of the world renowned fungi, insect, mites, nematode and spider specialists. They also learnt about the important role the ARC plays in documenting and protecting our rich fauna and micro-organisms that prevent new pest species from entering the country and the effect climate change may have on these organisms.