



Newsletter of the Plant Protection Research Institute (PPRI), an institute in the Natural Resources and Engineering Division of the Agricultural Research Council (ARC)

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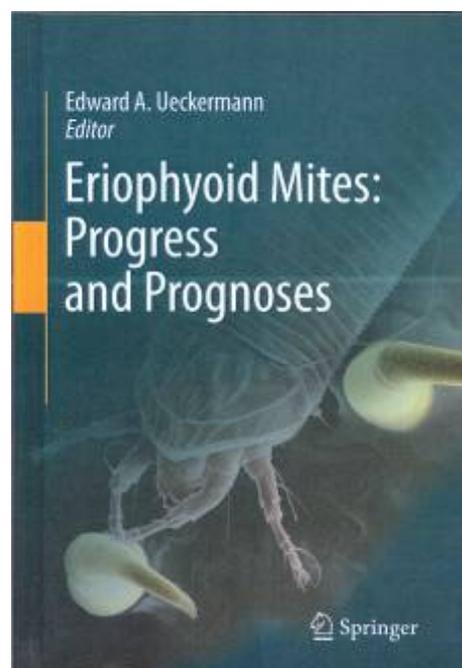
## Important new publications

### New book on Eriophyoid Mites

The first reference made to the minute, wormlike eriophyoid mites was in 1737 when it was suggested that galls and erinea on plants were caused by these arthropod maggots, while other taxonomists considered them to be fungi. Since 1887, numerous eriophyoid genera and single species descriptions have been made. An attempt to arrange the classification and research of the group resulted in a series of books (1975-1996).

However, an overview of eriophyoid research was necessary and, at a special eriophyoid session at the 6<sup>th</sup> European Acarology Symposium, a decision was made to compile all the papers (14), that were presented during the eriophyoid session, into a special Proceedings issue to be published by the journal, *Experimental and Applied Acarology*. Dr. Ueckermann was approached to act as Associate Editor of the special edition of this important book on eriophyoid mites.

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### Species catalogues: a must for biodiversity management

Taxonomy has many facets, and one of these is the documentation of the biota. For over half a century, South Africa has had catalogues of its flora and vertebrates. The invertebrate animals, however, have only been documented in literature scattered throughout many different publications, many of which are not available in local libraries. The Convention on Biological Diversity (CBD), to which South Africa is a signatory, recognized that a country cannot conserve or sustainably manage its biodiversity if it does not have an inventory of what occurs in that particular country. However, documenting the invertebrate fauna is easier said than done. Nevertheless, the South African National Biodiversity Institute (SANBI) and the South African Biosystematics Initiative (SABI) have prioritized the documentation of our fauna, and have created the South African Encyclopedia of Life (SAEOL) for this purpose. To succeed they need the assistance of other local organizations, including the ARC which employs the greatest number of invertebrate taxonomists in South Africa.

taxonomy division, because it fully realizes the value of correct identifications for the sustainable management of biodiversity, and that the farmer is the principal custodian of South Africa's biological diversity.

The ARC and SANBI are co-operating closely towards meeting the National objective, and the CBD requirement, of documenting our biota. Towards this end Connal Eardley and Rosalind Urban published a *Catalogue of Afrotropical bees*. Preparing this 548-page document for the peer-reviewed scientific journal *Zootaxa*, which has an ISI rating of about 0.8, was a mammoth task. SANBI, and Willem Coetzer from South African Institute for Aquatic Biodiversity (SAIAB), are converting the Catalogue into a suitable format for publication on SAEOL. Furthermore, the United National Food and Agriculture Organization (FAO) is using the Catalogue to produce national pollinator lists for the African countries participating in their International Pollinator Initiative's global project. So its publication was very timely.

For about a century the ARC has had a strong

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### Editorial Committee

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# Biosystematics

## Species catalogues (continued)

With the current concern regarding the loss of pollinators, and the potentially disastrous effects that this could have on agriculture and biodiversity conservation in general, the southern hemisphere continents have done very well in cataloguing their bees.

However, none of them has a catalogue that includes all literature references to each species. The comprehensive nature of Connal and Rosalind's catalogue should greatly assist young taxonomists, especially those in other African countries, to gain an understanding of bee diversity and to revise the taxonomies of their own bee faunas.



A small carpenter bee pollinating a pink flower

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## Course in basic entomology

Magritta Jacobs, a technical assistant with Plant Health Diagnostic Services based in Stellenbosch, attended a three day basic course in entomology at the Biosystematics Division at Roodeplaat in early July. Tinyiko Chauke of Entomology also attended to make it more interactive. Magritta was given a simple way to identify insect orders of quarantine importance, taken into the field to look for insects and shown how to preserve these specimens, and how to keep records. She also learnt how the Plant Health identifications are handled at Entomology, and was shown aspects of keeping a collection.

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Magritta Jacobs and Tinyiko Chauke

## What bee is that?

Thank a bee for the tasty bites of food you eat. This is because bees pollinate most of our flavourful foods, as well as many of our vitamin-rich foods. Bees are, therefore, responsible for most nice foods that are fruit flavoured. Just as we like foods with different flavours, so do bees, except that each bee species has its own specific taste preference. This means that we must protect all our many different bee species to keep our own meal and snack times enjoyable. And to keep us healthy.

Unfortunately, bees are quite sensitive to many land management practices. To keep our bee populations and ourselves healthy, we need to know which bee belongs to which species, and which plants it pollinates. Towards this end, scientists around the world are becoming increasingly interested in pollination biology. But pollination research cannot progress without the ability to identify bees, which is the work of the bee taxonomists. As with all taxonomists, bee taxonomists are in short supply and there is only one in South Africa, namely Connal Eardley. But we don't need a bee taxonomist to identify all the bees we study; rather, the taxonomist should mainly do research on bee taxonomy, produce identification tools, and teach students of pollination research and conservation how to use these tools. To promote this aim, ARC-PPRI hosted a week-long bee identification course during April this year, which was presented by Connal Eardley.

The Course was attended by nine students and staff from the Universities of KwaZulu-Natal, and Stellenbosch, the South African National Biodiversity Institute at Kirstenbosch, and KwaZulu-Natal Wildlife. The course took place at the ARC-Biosystematics Division's new premises at Roodeplaat. The participants all enjoyed the course, and the training provided will contribute towards a better understanding of pollination processes in South Africa, and more enjoyable and healthy meal times.

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Participants at the Bee Identification Course

## Biosystematics (continued)

### CRAB SPIDERS: IMPORTANT PREDATORS IN AGRO-ECOSYSTEMS

Thomisids are free-living spiders found mainly on foliage, with only a few genera living on the ground. They are commonly found on grass, shrubs, flowers and trees, and are one of the most dominant families recorded from crop vegetation where they play an important role in the natural control of pests in agro-ecosystems. The table below indicates the number of crab spider species recorded from crops. They are known to prey on a variety of both insect and mite species such as citrus psylla, citrus mite, crimson spider mite, common spider mite, aphids, thrips, beetles, bees, grasshoppers, flies, ants, etc. They are semi-sedentary, excel as ambushers, and are mainly active during the day. Although they have weak fangs, they secrete extremely potent venom that enables them to attack prey 2-3 times their own size. Unfortunately they also attack bees.

The Spider Research Centre at the ARC-PPRI is recognized as the crab spider specialists in Africa. Over several years we have surveyed crops to determine the spider diversity, and the role they play in agro-ecosystems. This was combined with extensive taxonomic research which, to date, has resulted in the revision of 14 thomisid genera of the region. The taxonomic research is continuing, and the genus *Simorcus* (see reference p. 12) has recently been revised with the revisions of another two genera, *Sylligma* and *Mystaria*, also completed and submitted for publication.

New projects are planned in collaboration with students from the University of Johannesburg, using barcoding to address certain taxonomic problems.

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| CROP       | NO. OF CRAB SPIDER SPP. |
|------------|-------------------------|
| Citrus     | 28                      |
| Cotton     | 21                      |
| Avocado    | 12                      |
| Macadamia  | 11                      |
| Pistachio  | 11                      |
| Tomato     | 4                       |
| Strawberry | 4                       |



*Oxytate argenteooculata* is the dominant species found in avocado orchards

#### Spiders and their prey



Charissa de Lange



Boeta Fourie



Wolf Avni



Wolf Avni

## ***Biosystematics (continued)***

### **COURSE ON DNA BARCODING AND GRANT WRITING SKILLS**

During April, Petro Marais and Tsidi Makatoane from the Arachnida Unit attended a course on DNA barcoding, and grant writing skills held at the University of Johannesburg. The course was sponsored by the Consortium for the Barcode of Life (CBOL), and was presented by Dr Michelle van der Bank and Olivier Maurin from the Department of Botany and Plant Biotechnology at the University of Johannesburg. The aim of the course was to build scientific capacity in DNA barcoding in Africa, and there were 20 participants from African countries, including Zimbabwe, Ethiopia, Kenya, Cameroon, Ghana, Nigeria, and South Africa.

The DNA barcoding course involved introductory lectures to the molecular biology techniques used, and hands-on laboratory practicals for each participant, including sampling for DNA work, PCR,

sequencing, and editing of sequences. The scientific grant writing and log-frames course focused on grant writing using the Logical Framework approach for project design and management. During the course, previous UK-Africa grants were used as case studies, and hands-on exercises were done where participants were required to write a 'ghost' log-frame matrix.

The technology and skills gained through the attendance of this course will now be transferred to the Arachnida Unit. A project involving the DNA barcoding of South African arachnida has already been successfully registered with the International Barcoding of Life facility (iBOL) in Canada.

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Participants of the Barcoding course

### **SPIDER-SORTING WORKSHOP**

Over a weekend in June, a group from the Spider Club spent a whole day at the Spider Research Unit (Roodeplaat West campus) to assist in sorting the large number of SANSA specimens. A further > 10000 bottles still require sorting, identifying, and labelling (see photo below). Support was provided by Ansie Dippenaar, Petro Marais, and Robin Lyle of the Ditsong Museum of Natural History. This fun day was enjoyed by all and >200 bottles were sorted.



Astri Leroy

Front: Gina Wilgenbus, Petro Marais, and Carol Smith  
Back: Ansie, Robin Lyle, Joan Faiola and Lance Robinson

## ***Biosystematics (continued)***

### **Workshop co-hosted by the Mycology Unit and African Mycological Association**

The National Collection of Fungi, and the African Mycological Association co-hosted a workshop on the 'Identification of Ascomycota and their anamorphs' on behalf of the Darwin Initiative, and the African Workgroup for Fungal Conservation (or IUCN group). The workshop was presented by Dr David Minter from CABI, UK, from 26 to 30 April 2010. The first three days were presented at FABI, University of Pretoria, and consisted of hands-on practical sessions during which attendees made slides of fungi from plant material, identifying them by using identification keys under the watchful eyes of Dr Minter. Day four was spent at the ARC-Roodeplaat campus with the collecting and examination of various fungal specimens. Staff of the Mycology Unit also had the opportunity to discuss the PREM (National Collection of Fungi, dried herbarium collection) collection's digitization with Dr Minter, who is renowned for his website "Cybertruffle" - an extensive fungal literature database, and he made valuable inputs. The day's work was followed by a tour of the Mycological collections and a braai at the Biosystematics Building. The workshop was aimed at mycologists from African countries, and was attended by scientists from Lesotho, Nigeria, South Africa and Zimbabwe.

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Workshop participants



### ***The NHC survey: National Collections of Fungi***

As part of the DST/NRF survey of all National History Collections in South Africa, the Mycology Unit survey was conducted on 14 May by Prof Wally Marasas, formerly of the Medical Research Council (MRC). Prof. Marasas' long-standing affiliation with the Unit began when he was a researcher at the Unit during the late 1970s at Vredehuis. This was therefore a 'trip down memory lane' for everyone at the Unit, and Prof. Marasas was uniquely able to appreciate the new premises. He familiarized himself with the new Collection's outlay and framework, after which the content of the survey document was discussed in more detail. Discussions were also held regarding the challenges facing the Collection, and the progress made in promoting the collection as an African depository of fungal reference material. Although he spent only one day visiting the Collection, we were all encouraged by his comments and enthusiasm for mycology.

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Prof. Marasas, Riana Jacobs, and Mariette Truter with the Collection

### ***Fusarium identification course presented by the Mycology Unit***

During May, the Mycology Unit presented a course on the identification of *Fusarium* species associated with cereals. This is a very important fungal pathogen, and the course is presented annually on demand. It was presented at the conferencing facilities of the Range and Forage Unit adjacent to the Biosystematics Building. It was attended by candidates from the University of Lesotho, the Agricultural College of Botswana (Gaborone), Department of Agriculture, Forestry and Fisheries; Department of Environmental Affairs; the Department of Rural Development; as well as ARC -Summer Grain, and ARC - Plant Protection Research Institutes. The course manual was compiled by Ms Riana Jacobs, and lectures were presented by Ms Riana Jacobs and Dr Elna J. van der Linde.

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Course participants

## Biosystematics (continued)

### PARASITIC MITES ON WILD ANIMALS

South Africa has a rich diversity of parasitic mites that are of medical and veterinary importance to the country. Over the past few years, our only parasitic mite specialist, Dr Eddie Ueckermann, has become involved in several research activities at various universities.

- Since 2005 Dr. Ueckermann has been working with Dr. Sonja Matthee from the Dept Conservation Ecology and Entomology, Stellenbosch University, on the ectoparasites of small rodents and, in particular, on the diversity of the parasites of *Rhodomys pumilio* (Muridae). To date, this collaborative research has resulted in the description of three new mite species. A fourth paper on the ectoparasite diversity on rodents of the De Hoop Nature Reserve, Western Cape, has been submitted, while the descriptions of five new species are being prepared. From more than 2000 specimens sampled, 19 species have been identified so far. Dr Ueckermann also presented a course, funded by the NRF, on ectoparasitic mites to eight students at the Stellenbosch University this year.
- During March/April this year Dr Ueckermann identified ectoparasitic mites collected from bats by a student from the University of Cape Town, Mr. Simon Wood. In 307 specimens sampled, eight parasitic mite species were recognized, of which four may be new to science.
- Several students of the Department of Entomology and Zoology, University of Pretoria, are involved in research on small mammals. Dr Ueckermann assisted with the identifications of ectoparasitic mites on small mammals such as moles and shrews. He is currently co-supervisor of a Ph.D. student, Mrs Dina Fagir, and is looking at the ectoparasites of several small mammals such as the dormouse, spiny mouse, swamp musk shrew, and single-striped mouse at Ezemvelo Nature Reserve.

**Contact: Dr Eddie Ueckermann at Uecker-**



Some of the bats sampled for parasites



Striped Mouse  
(*Rhodomys pumilio*)



*Rhodomys pumilio*

## SPIDER RESEARCH SUPPORT TO STUDENTS

The Spider Research Unit is currently involved in >10 projects with students from several universities throughout the country. This involvement ranges from basic support and identifications of specimens, to joint projects and supervision of post graduate studies. To date, a total of 18 MSc, and 2 PhD studies on spiders have been co-supervised at six universities. The types of study range from taxonomy, to surveys in conserved areas or agro-ecosystems. These interactions are very important for the Unit as most of the research projects result in joint publications. A total of 28 peer reviewed papers on spiders have been published in collaboration with universities, and >15 000 voucher specimens have been deposited in the National Collection of Arachnida. These survey specimens are important contributions as they usually represent series of samples taken over a 6-12 month period. New collaboration initiated during the report period was with the University of Johannesburg, where two MSc students will study two different genera of spiders, using barcoding in an attempt to address taxonomic problems.

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Students from the University of Limpopo discussing their projects

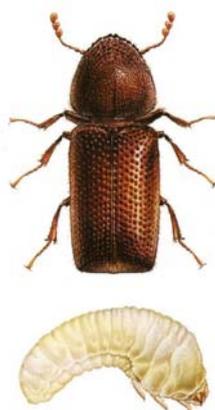
## Pesticide Science

### The Larger Grain Borer (LGB) has joined the Stored Grain Insect Culture at Roodeplaat

Since the Larger Grain Borer (LGB) (*Prostephanus truncatus*) was first found by the Plant Protection Research Institute (PPRI) in South Africa in 2001, ARC-PPRI in conjunction with the Department of Agriculture, Forestry and Fisheries (DAFF), has been monitoring the distribution of the insect pest.

While monitoring for the insect in the Limpopo Province, ARC-PPRI's Stored Grain and Oilseed Research Unit decided to capture a field strain. Adjustments were made to the insects breeding facilities according to quarantine regulations.

The Unit now has a flourishing LGB (*Prostephanus truncatus*) culture that can be used in registration and other trials. The biological predator of the LGB, namely, the beetle *Teretriosoma nigrescens*, was also captured in the field, and is now in the process of increasing their numbers for further trials and studies.



Besides the new quarantine facility housing the larger grain borer, the Unit is also the proud owner of the following cultures of stored grain insect pest species housed in separate culture facilities:

*Sitophilus zeamais* (maize weevil)  
*Sitophilus granarius* (wheat weevil)  
*Sitophilus oryzae* (rice weevil)  
*Tribolium castaneum* (rust red flour beetle)  
*Tribolium confusum* (confused flour beetle)  
*Rhizopertha dominica* (lesser grain beetle)  
*Oryzaephilus surinamensis* (saw toothed grain beetle)  
*Cryptolestes ferrugineus* (rust red grain beetle)  
*Lasioderma serricorne* (tobacco beetle)  
*Ephestia cautella* (tropical warehouse moth)  
*Teretriosoma nigrescens* (teretrios beetle)

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### 'ECORAT' presented at International Conference on Rodent Biology and Management



PPRI researchers co-authored a further two papers on sociology and on population dynamics (see p. 13).

In a follow-up from the papers presented at the ICRBM, the 'Ecorat team' from PPRI were invited to act as external advisors to four, fourth year students from the University of Venda's School of Environmental Sciences. Based on our rodent management experience, and successes in the Ecorat and similar projects, we were invited by Professors Rod Baxter, and Peter Taylor, from the University to assist their Department of Ecology and Resource Management students with the practical set-up of their 'Ecorat mini-projects'. In May, we attended the School's Research Day when students presented their study proposals, met with the heads of the villages to explain the proposed projects, and had a look at the selected study terrains. The projects will entail:

- evaluating the knowledge, attitude, and practice (KAP) of small-scale farming communities;
- impact of intensive rodent trapping in households of a rural village;
- comparison of rodent diversity in various habitats, ranging from a commercial, irrigated maize monoculture; dry land mixed crop subsistence farming systems; fallow land and forestry to 'islands' of natural vegetation; and

During April, three PPRI researchers, Frikkie Kirsten, Phaniel Malebana, and Emil von Maltitz, attended the 4<sup>th</sup> International Conference on Rodent Biology and Management (ICRBM) in Bloemfontein. Frikkie and Emil also served on the ICRBM local organising committee. More than 140 delegates from over 30 countries from all six continents attended the week-long conference, hosted by the Bloemfontein National Museum on the Campus of the University of the Free State. The conference was a first for Africa, since the previous ICRBM conferences have been held China, Australia, and Vietnam. At the ICRBM, 106 papers and 47 posters were presented across nine symposia. An evening premiere of the new *Animal Planet* documentary, 'Swarm Chasers: Rats', which is about the 50-year cycle of bamboo flowering in south Asia, and which affects rats and people in Bangladesh and Myanmar, was also shown.

The ICART/CRAFT-funded project, Development of Ecologically-Based Rodent Management for the SADC Region (ECORAT), had come to an end (see PPNews 83), and the conference provided an ideal showcase to share the results with fellow scientists. Seven papers and three posters were presented from the Ecorat project at the conference, while Ecorat also featured in two plenary talks. Emil von Maltitz presented a paper on 'The impact of intensive trapping at the community level in ecologically based rodent management', while the three

## ***Pesticide Science (continued)***

### **‘ECORAT’ continued**

- a survey of perceived, and actual crop damage caused by the Lwamondo ‘sacred baboons’.

The projects will be conducted in Lwamondo on the southern edge of the Soutpansberg, and in the “Tshiombo” irrigation scheme at Mbahela in the north of Vhembe district. The results of the field work are to be written up before April 2011, but the projects are structured to enable the students to extend projects for further, post-graduate studies. We wish our four students well in their assignments.

Further information about the Ecorat project and the conference can be found through the websites:

<http://www.nri.org/ecorat>

<http://www.icrbm.org>

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Lwamondo villages



“Tshiombo” irrigation scheme at Mbahela



Meeting farmers of remote villages in the eastern Soutpansberg



Islands of natural vegetation in forestry and in cultivated lands

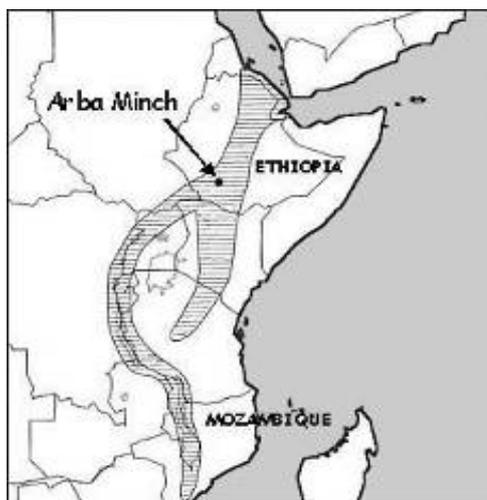
## Weeds Research

### Lantana herringbone leafminer now in Ethiopia

We recently reported that the lantana biocontrol agent, *Ophiomyia camarae*, had reached Madagascar (Plant Protection News No. 83: 14). It has now been found near Arba Minch, between Lakes Chamo and Abaya, in SW Ethiopia.

Parasitoid-free material of *O. camarae* was exported by ARC-PPRI to the National Agricultural Research Organization in Kampala, Uganda, in late October 2008. Only a small number of adult flies were released, but they did not establish, possibly because of unusually high temperatures and the approaching dry season (R. Molo, NARO, pers.comm. 2009). To the best of our knowledge, Ethiopia has never introduced any biocontrol agents for lantana. *Ophiomyia camarae* is a small (about 2 mm long) agromyzid fly that dispersed rapidly from South Africa (where it was released in late 2001) to neighbouring countries, including Mozambique (*ibid.*). We hypothesize that the fly dispersed naturally to Ethiopia, 'hopping' along a series of lantana infestations in the western arm of the Great Rift Valley. The herringbone leafminer symptoms were sparse at Arba Minch in the Rift Valley, and absent in S and SE Ethiopia, and the inland areas of Kenya and Tanzania (A. Witt, CABI-Africa, pers.comm. 2010). We hope that this biocontrol agent will provide a useful reduction of the rates of growth and reproduction of lantana weed in Ethiopia.

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Map adapted from Gaimari, S.D. & Raspi, A. 2002. African Entomology 10: 241-264



Leaves of *Lantana camara* at Arba Minch, Ethiopia, showing the typical herringbone mines of *Ophiomyia camarae* along the midrib. Photo: ABR Witt, CABI-Africa

### The biological control of the invasive plant *Parthenium hysterophorus* in South Africa

*Parthenium hysterophorus* (Asteraceae) is an annual herb originating from Central and South America that has invaded southern and eastern Africa, Asia, and Australia, causing substantial economic losses in some countries. Infestations of parthenium severely impact on agriculture by reducing grazing land, and reducing crop yield (e.g. up to 90% yield loss recorded in sorghum), besides impoverishing the biodiversity. Parthenium also affects human and animal health by causing severe respiratory and skin allergic reactions. Seed dispersal occurs by means of wind, water, vehicles, machinery, animals, seed lots, and stock feed.

In South Africa parthenium has already invaded KwaZulu-Natal, Mpumalanga, and North-West provinces. Roadsides, grazing, cropping, fallow and conservation land are affected, and some rural homesteads are entirely surrounded by dense infestations of parthenium. Parthenium also occurs throughout Swaziland, as well as in Mozambique, Zimbabwe, Tanzania, Kenya, Uganda, Eritrea, and Ethiopia where it severely impinges on the livelihood of millions of people. Predictive modelling by the PPRI has shown that most of sub-Saharan Africa is climatically suitable and at risk from invasion by this plant.

Chemical control is costly and requires follow-up treatments, and hand-weeding, which is widely used in Africa, carries associated health risks. Reducing stocking density to improve grass cover has been shown to be very effective, but may not always be practical in parts of Africa that have unfenced and communal grazing lands. Biological control has good potential as a management tool for parthenium in Africa. This has been illustrated in Australia, where the weed has been successfully managed by the establishment of seven insect agents and two rust fungi. Other management practices utilised in Australia include chemical control, reduced stocking densities, and wash-down facilities to remove seed from vehicles. The use of competitive pasture plants to outcompete parthenium is currently being investigated.

The ARC-PPRI is conducting research on the biological control of this weed in South Africa, based on the results of the Australian programme. The leaf rust fungus *Puccinia xanthii* var. *parthenii-hysterophorae* (= *P. melampodii*) (Pucciniales: Pucciniaceae) was imported from its introduced range in Australia, tested by the PPRI Weeds Division in Stellenbosch, and recently approved for release by the Department of Agriculture, Forestry and Fisheries (DAFF), pending approval by the Department of Water and Environmental Affairs (DWEA). The related rust fungus, *P. abrupta* var. *partheniicola* (Pucciniales: Pucciniaceae), was found to be present in South Africa, but was not introduced for biocontrol purposes. Following host range testing of the leaf-feeding beetle *Zygogramma bicolorata* (Coleoptera: Chrysomelidae) originating from Mexico, and the stem-boring weevil *Listronotus setosipennis* (Coleoptera: Curculionidae) from Argentina, by the PPRI Weeds Division at Cedara, applications are to be submitted to DAFF and DWEA for approval to release these agents. The thermal physiologies of the two insect agents have also been investigated by the University of KwaZulu-Natal MSc students, Helen King and Zukiswa Shoba, to determine their climatic tolerances so that the most climatically suitable sites may be selected for optimal establishment when these agents are released.

Long-term studies of parthenium weed have been conducted by the ARC-PPRI Weeds Division at sites in KZN and Mpumalanga provinces for at least four consecutive years prior to the introduction of biocontrol agents, and have demonstrated extreme annual fluctuations of the parthenium seed bank in the soil, with a maximum of 95 000 seeds per m<sup>2</sup> recorded in dense infestations at some sites in some years. These sites will continue to be monitored after biocontrol agents are established, to assess the effect of biological control on the parthenium soil seed bank.

## Weeds Research (continued)

### The biological control of *Parthenium hysterophorus* (continued)

A suite of natural enemies affecting various parts of the plant are required for optimal biological control of parthenium. Therefore, in late February 2010, PPRI researchers Lorraine Strathie and Dr Andrew McConnachie visited Australia to collect and import additional insect agents that have established on parthenium there, and to investigate their suitability for South Africa. During the visit, the researchers had the opportunity to work with and learn from experts on parthenium biocontrol, Dr K. Dhileepan, Mr Mariano Trevino of the Queensland DEEDI Alan Fletcher Research Station in Brisbane, and Dr Rachel McFadyen. ARC-PPRI researchers also held discussions with Dr Steve Adkins and his parthenium research group at the University of Queensland, regarding the biology and management of parthenium weed. Unfortunately, field work was constrained by extensive floods in the Queensland State. Starter cultures of the stem-galling moth, *Epiblema strenuana* (Lepidoptera: Tortricidae), and the seed-feeding weevil, *Smicronyx lutulentus* (Coleoptera: Curculionidae), both damaging agents on parthenium, were nevertheless collected in good numbers from the Rockhampton region in Queensland and imported into the PPRI quarantine at Cedara, KZN, where cultures of both agents have since been established. Their host range with regards to South Africa's native and economically important plants closely related to parthenium will now be assessed. The damaging sesiid moth, *Carmenta ithacae*, with larvae that tunnel in parthenium stems to the root crown, was not available for collection at the time and is to be imported at a later stage.

The ARC-PPRI parthenium biocontrol project has recently been granted further funding until 2013 by the Working for Water Programme and, during this period, will focus on assessing the suitability of the newly imported insect agents, as well as releasing, establishing and evaluating the other biocontrol agents which have been shown to be suitable for release, pending their approval for release by authorities.

In the next issue, collaboration with other African countries on the biological control of parthenium will be discussed.

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The seed-feeding weevil *Smicronyx lutulentus* on parthenium, recently collected and imported from its introduced range in



Galling by *Epiblema strenuana*



Pupa of *Epiblema strenuana*

# Plant Pathology and Microbiology

## Bacteria found widely on indigenous trees

In 1998, during a visit by the foremost authority on Huanglongbing, or citrus greening disease, a French bacteriologist, Prof. J. Bové, along with local researchers Prof. Lise Korsten, of the University of Pretoria, and Dr. Hennie le Roux (Citrus Research International), discovered a new bacteria on *Calodendrum capense* (Cape chestnut), an indigenous member of the *Rutaceae* or citrus family (Fig. 1), in the Stellenbosch district. After sequencing a portion of the genome of the bacteria, Prof. Bové's group at INRA in Bordeaux, France, could demonstrate that the bacteria was very closely related to the one associated with the serious citrus greening disease (Fig. 2) in South Africa, "*Candidatus Liberibacter africanus*" (Laf). In fact, their data suggested it was a subspecies of Laf, which they subsequently named "*Candidatus Liberibacter africanus spp. capense*" (LafC). No further studies were done on this bacterium in the following ten years.

In recent but, thus far, unpublished studies, a real-time PCR capable of specific detection of LafC was developed. Using this, a total of 263 Cape chestnut samples, collected from Mpumalanga, Limpopo, Gauteng, KwaZulu-Natal, Western Cape, and Eastern Cape, were tested by Prof. Gerhard Pietersen and Baby Phahladira, as part of Baby's MSc. studies (Fig. 3). It was shown that LafC commonly infects *C. capense* in all regions where samples were collected, including areas in South Africa where citrus trees are free of Laf (e.g. Eastern Cape). Interestingly, this bacterium was not found during a recent survey of citrus greening on citrus, in which 80 samples were sequenced. It is important that further studies are conducted to determine whether the LafC/*C. capense* epidemiology overlaps with Laf/Citrus. Sites in the Eastern Cape, in which LafC infected *C. capensis* trees were identified in close proximity to citrus groves, are ideal to assess whether transmission of LafC occurs amongst the two Rutaceous species naturally, and are the focus of a study by one of Prof. Pietersen's students, Miss Ronel Viljoen at the University of Pretoria. Experimental transmission by grafting, and through the Laf vector, the psylla *Trioza erytrae* of Laf on citrus to *C. capensis*, and also LafC on *C. capensis* to citrus, are planned.

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Fig. 2: Typical blotchy mottle symptoms on the leaves of a citrus greening disease affected citrus tree in South Africa



Fig. 3: Baby Phahladira, Ronel Viljoen and Olivier Zablocki, all students of Prof. Pietersen, collecting leaf samples of indigenous trees to test for the presence of *Candidatus Liberibacter* species



Fig. 1: *Calodendrum capense*, Cape Chestnut. Clockwise from top Left: a) young tree in flower in Pretoria, b) stem, c) capsule and seeds, d) leaf and e) flowers

# Technology Transfer

## Scientific publications

**ANDRE, H.M., UECKERMANN, E.A. & RAHMANI, H. 2010.** Description of two new species closely related to *Tydeus spathulatus* (Acari: Tydeidae) from Zimbabwe and Iran. *Journal of Afrotropical Zoology* 6: 111-116.

**BOWNES, A., HILL, M.P. & BYRNE, M.J. 2010.** Evaluating the impact of herbivory by a grasshopper, *Cornops aquaticum* (Orthoptera: Acrididae), on the competitive performance and biomass accumulation of water hyacinth, *Eichhornia crassipes* (Pontederiaceae). *Biological Control* 53: 297-303.

**CHABOO, C.S., GROBBELAAR, E. & HERON, H. 2010.** An African leaf miner, *Oncocephala promontorii* Péringuey, 1898 (Chrysomelidae: Cassidinae: Oncocephalini): biological notes and host records. *The Coleopterists Bulletin* 64(1): 21-29.

**DE LILLO, E., CRAEMER, C., AMRINE, J.W. JR. & NUZZACI, G. 2010.** Recommended procedures and techniques for morphological studies of Eriophyoidea (Acari: Prostigmata). *Experimental and Applied Acarology* 51: 283-307.

**EARDLEY, C. & URBAN, R. 2010.** Catalogue of Afrotropical bees (Hymenoptera: Apoidea: Apiformes). *Zootaxa* 2455: 1-548.

**GILIOME, J.H. & MILLAR, I.M. 2010.** Pomegranate or ash whitefly, *Siphoninus phillyreae* (Haliday) (Hemiptera: Aleyrodidae) recorded from South Africa. *African Entomology* 18: 200-202.

**GROBBELAAR, E., VISSER, D. & ADLBAUER, K. 2010.** A stem borer of egg-plant, *Oberea trigonalis* Breuning, 1950 (Cerambycidae: Lamiinae): biological notes and host plant records. Short Communication in *African Entomology*. 18: 210-212.

**HADDAD, C.R., HONIBALL, A.S., DIPPENAAR-SCHOEMAN, A.S., SLOTOW, R. & VAN RENSBURG, B. 2010.** Spiders as potential indicators of elephant-induced habitat changes in endemics and forest, Maputaland, South Africa. *African Journal of Ecology* 48: 446-460.

**HASSEN, A.I. & LABUSCHAGNE, N. 2010.** Root colonisation and growth enhancement in wheat and tomato by rhizobacteria isolated from the rhizosphere of grasses. *World J Microbiol Biotechnol* D01 10.1007/s11274-010-0365z. March 2010.

**JACOBS, A., VAN WYK, P.S., MARASAS, W.F.O., WINGFIELD, B.D., WINGFIELD, M.J., COUTINHO, T.A. 2010.** *Fusarium ananatum* sp. nov. in the *Gibberella fujikuroi* species complex from pineapples with fruit rot in South Africa. *Fungal Biology* ([doi:10.1016/j.funbio.2010.03.013](https://doi.org/10.1016/j.funbio.2010.03.013)).

**KHANJANI, M., RAISII, H., IZADI, H. & UECKERMANN, E.A. 2010.** A new species of *Cheylestigmaeus* Willmann (Acari: Stigmaeidae) from Eastern Iran. *International Journal of Acarology* 36(1): 7-13.

**MCKAY, F., OLEIRO, M., FOURIE, A., & SIMELANE, D. 2010.** Natural enemies of balloon vine *Cardiospermum grandiflorum* (Sapindaceae) in Argentina and their potential use as biological control agents in South Africa. *International Journal of Tropical Insect Science*, 30: 67-76.

**MOSTERT, L., BESTER, W., JENSEN, T., COERTZE, S., VAN HOORN, A., LE ROUX, J., RETIEF, E., WOOD, A.R. & AIME, M.C. 2010.** First report of leaf rust of Blueberry caused by *Thekopsora minima* on *Vaccinium corymbosum* in the Western Cape, South Africa. *Plant Disease* 94: 478.

**SIMELANE, D.O. (2010)** Potential impact of an introduced root-feeding flea beetle, *Longitarsus bethae*, on the growth and reproduction of an invasive weed, *Lantana camara*. *Biological Control* 54: 114-118.

**STILLER, M. 2010.** Revision of the Southern African leafhopper genus *Pravistylus* (Hemiptera, Cicadellidae, Deltocephalinae). *Zootaxa* 2468: 1-81.

**UECKERMANN, E.A., THERON, P.D. & TIEDT, L.R. 2010.** Revision of the genus *Obuloides* Baker and Tuttle, 1975 (Acari: Tenuipalpidae), with the description of five new species. *International Journal of Acarology* 36: 151-167.

**VAN NIEKERK, P. & DIPPENAAR-SCHOEMAN, A.S. 2010.** A revision of the spider genus *Simorcus* Simon, 1895 (Araneae: Thomisidae) of the Afrotropical Region. *African Entomology* 18: 66-86.

## Semi-scientific papers

**GROBBELAAR, E. 2010.** Relocation of the South African National Collection of Insects. *Chrysomela* 52: 3.

**HENDERSON, L. 2010.** SAPIA Newsletter No. 15.

## Talks and courses

**Klein H. 2010.** Biological control of invasive plants. Lecture to the second-year Botany students at the University of Pretoria on 20 April 2010.

**Van der Linde, E. 2010.** How to approach identification of plant pathogens. Lecture to the 3<sup>rd</sup> year and post graduate students at the University of Pretoria in April 2010.

**Research day of the South African Roobos Council and other researchers and farmers at Clanwilliam on 5 May, 60 attendants. The following lectures were presented:**  
**LAMPRECHT, SC. 2010.** The production of healthy organic roobos.

**WESSELS, B., LAMPRECHT, SC, LINDE, C. & MOSTERT, L. 2010.** Characterize genetic variation found in *Botrytis* populations from roobos nurseries.

**BAHRAMISHARIF, A., LAMPRECHT, SC, BOTHA, W, MCLEOD, A. 2010.** Characterize *Pythium* isolates associated with damping-off of roobos seedlings.

## Radio

**Dippenaar-Schoeman, A.S. 2010.** (Radio Laeveld, afternoon Nature program) 10 min; 12 broadcasts.

**Stals, R. 2010.** Radio interview: *Radio Sonder Grense*, programme 'Ekoforum' (SABC). Interview about the critically endangered Brenton Blue Butterfly, broadcast 18 April 2010.

## TV

**Dippenaar-Schoeman, A.S. 2010.** Live broadcast on KykNet (Kwela 7/4/2010): about release of new book, and the South African National Survey of Arachnida.

**Dippenaar-Schoeman, A.S. 2010.** AgriTV2 (11 May) – the South African National Survey of Arachnida.

**Dippenaar-Schoeman, A.S. 2010.** AgriTV2 (18 May) – the new book “Spiders of the Kalahari”.

## The ECORAT oral papers presented at the ICRBM:

Belmain, S.R., Dlamini, N., Eiseb. S., Kirsten, F., Mahlaba, T., Makundi, **R., Malebane, P., Maltitz, E.** Von, Massawe, A., Monadjem. A., Mulungu, L., Taylor, P., and Tutjavi, V. Differential Changes in Farmers' Understanding of Rodent Management through Involvement in Ecologically-Based Rodent Management Research in Swaziland, Tanzania and Namibia.

Massawe, A.W, Mulungu, L., Makundi, R., Dlamini, N., Eiseb. S., **Kirsten, F.**, Mahlaba, T., **Malebane, P., Maltitz, E. Von**, Monadjem. A., Taylor, P., Tutjavi, V. and Belmain, S.R. Spatial and Temporal Population Dynamics of Rodents in Three Geographically Different Regions in the SADC Region.

Von Maltitz, E., Belmain, S.R., Dlamini, N., Eiseb. S., **Kirsten, F.**, Mahlaba, T., Makundi, R., **Malebane, P.**, Massawe, A., Monadjem. A., Mulungu, L., Taylor, P., and Tutjavi, V. The Impact of Intensive Trapping at Community-level in Ecologically-Based Rodent Management Research in Swaziland, Tanzania and Namibia.

## PPRI Researcher completes her PhD degree

Riana Jacobs from the Mycology Unit, Biosystematics has recently completed her PhD study.

The study was entitled: Taxonomy of some species in the *Gibberella fujikuroi* complex and focused on an integrated approach to the demarcation of species in this complex. Two new species were also described.

The study was undertaken under the supervision of Profs. TA Coutinho, MJ Wingfield, BD Wingfield and WFO Marasas at the Forestry and Agricultural Biotechnology Institute at the University of Pretoria.

