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Excellence in Research and Development

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General inquiries

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Plant Protection Research Institute

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

XXIII International Congress of Entomology 6 -12 July, 2008

"Celebrating Entomology: Contributions to Modern Science"

The Congress was opened by the Minister of Science and Technology, Mr Mosibudi Mangena. It was followed by a spectacular display of South African cultures, setting the tone for the Congress, which was a resounding success. There were six internationally renowned plenary speakers, speaking on topics ranging from malaria and mosquitoes, functional organization of tropical insects to plant - insect interactions. The wide range of congress topics was divided into 18 concurrent sections, allowing everyone a chance to show-case and discuss their own unique research. The overall standard of the talks and posters was exceptional. Specific interest group social meetings were also well attended, allowing both the expert scientists and new upcoming scientists to meet and exchange ideas.

ARC-PPRI was privileged to be able to send 23 of its own entomologists, who were joined by a large contingent of colleagues from various other ARC institutes (see page 21 for titles of presentations). It was a unique opportunity for these scientists to interact with the world's experts right on our own doorstep. There were 2237 delegates and accompanying persons from 93 countries, 23 of them within Africa, as well as 319 delegates from South Africa.

The entomologists from ARC-PPRI were dedicated to ensuring the success of the Congress and all were involved in almost every aspect of the event. They had representatives on the South African Management Committee and the Durban Organizing Committee. There were many ARC-PPRI delegates involved as Section Conveners and Symposium Organizers, besides presenting their own work either as oral presentations or posters. Their work was almost as diverse as the rest of the Congress, spanning topics from biological control of weeds, insect ecology and honey bee research to biosystematics.

Durban as a venue lived up to all our expectations, with the International Convention Centre providing a professional and elegant setting for delegates to meet and interact on a global scale.

The South African Invertebrate Art Exhibition, supported by De Beers and E Oppenheimer & Son, provided a delightful range of insect art. The ARC had a publicity stand in the exhibition hall, hosted by PPRI's public relations staff. Various PPRI staff members were also involved in the display stand of the Entomological Society of Southern Africa and the open-public Kwanunu displays hosted at the Durban Natural Science Museum (see separate article).

One of the highlights of the Congress was the launch by the South African Post Office of a new stamp commemorating the recently discovered insect order, the Mantophasmatodea (heelwalkers). Other highlights included the beach party hosted by the City of Durban and the Congress banquet.

Entsoc display at the ICE2008

Vivienne Uys (ARC-PPRI), Prof. Walter Tschinkel (plenary speaker from USA) and Mrs Vicki Tschinkel at ICE2008

Harlequin Mania in South Africa

One of the world's worst invasive, harmful insects, the harlequin lady beetle (*Harmonia axyridis*, family Coccinellidae), has established in South Africa and is rapidly spreading through the region.

The potential untoward effects of the ' harlequin' were summarised in *Plant Protection News* No. 75 (March 2008). In essence, harlequins are effective predators of aphids and other soft-bodied pests, for this reason long considered valuable biocontrol agent s and in the past deliberately released in some countries (not South Africa). Besides preying on pestiferous arthropods, however, they willingly feed on eggs and immatures of various non-pest insects, including beneficial kinds and including indigenous and beneficial lady beetle species. The net effect is—at least—that they have the capability of displacing indigenous lady beetle species, with cascading effects throughout ecosystems. Additionally, they have the potential to adversely impact on wine production, they are a household nuisance, and some people are very allergic to their secretions.

As yet, there are no hard data to prove that the harlequin is bringing to bear all its negative effects in South Africa, but judging on research done in North America and Western Europe, where the harlequin has been present longer than in South Africa, there is little reason to doubt that it will show its untoward characteristics also here. Indigenous to eastern Asia, the first established colony of this invader in South Africa was discovered in September 2004 in the southern Cape. One matter that has become very clear in the past six months is that it has already spread throughout much of the southern, eastern and central parts of southern Africa (see map), and that it is, in places, extremely abundant.

Citizen science

The arrival of the harlequin lady beetle in South Africa was initially announced in a scientific paper published in August 2007. A few scientists thereafter reported the harlequin to be present also elsewhere in the country. It was the March 2008 article on this invader in *Plant Protection News*, however, that caused quite a stir. That article spawned a large number of newspaper, magazine and internet articles on the topic (including front-page coverage in the *Cape Times* and *Pretoria News*), as well as several radio broadcasts. This media exposure triggered an avalanche of phone calls and e-mails to the "harlequin contact" at PPRI's National Collection of Insects, beetle researcher Riaan Stals. Close on 400 reports have since April 2008 been received from concerned people, quite literally ranging from Houghton to Soweto and from Table Mountain to the mountains of Lesotho. More reports are still flowing in. Citizen science is at work.

International collaboration

At the International Congress of Entomology, held in Durban in July 2008, a full symposium was dedicated to the "harlequin phenomenon" worldwide. A large number of "harlequin people" from nine countries contributed. Riaan Stals presented the South African perspective at the Congress. Additionally, an informal meeting was held in Durban, where he had the opportunity to discuss the South African situation with a group of leading British and French researchers, and he was informally appointed *ad hoc* South African representative to the large international group of scientists studying the invasion biology of this insect.

A few photographs submitted by the citizen scientists see more on p. 22

It is not known how the harlequin reached South Africa, nor where the South African populations originated from. Specially preserved harlequin lady beetles from four far-flung localities in South Africa were sourced and donated to the "harlequin group" at the Institut National de la Recherche Agronomique (INRA) in France—through sophisticated molecular analyses they will soon be able to tell where the South African harlequins came from. After that, it may become possible to figure out *how* they managed to get to South Africa.

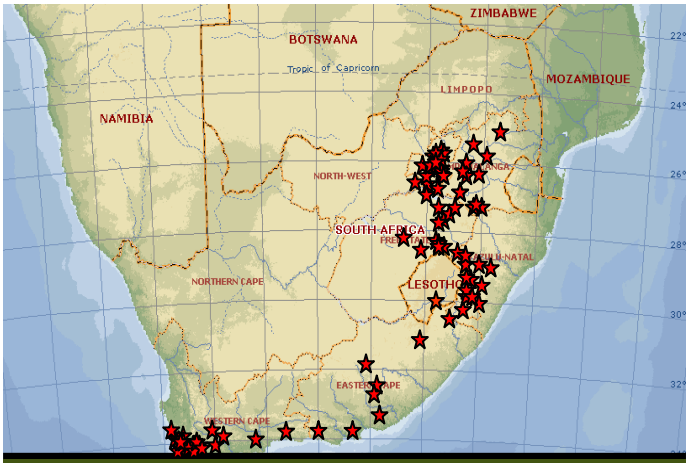
A few scientists still hold a dissenting view that the harlequin is a positive addition to the fauna in its adopted ranges, being a superior predator of various aphid species in agroecosystems. However, numerous studies in the Northern Hemisphere, as published in the current scientific literature, clearly point to the harlequin exerting a significantly negative effect on both agricultural and natural ecological communities.

How YOU can (still) help

In *Plant Protection News* No. 75 (March 2008) the recognition of the harlequin lady beetle was described in some detail (http://www.arc.agric.za/home.asp?pid=376&toolid=2&itemid=4819). Experience has taught that they are easily enough recognisable on grounds of their whitish "ears" and the black "M" or "W" just behind the head (see photographs).

Anybody finding, anywhere in Africa, any number of harlequin lady beetles—or lady beetles suspected to be the harlequin—is urged to collect the beetles and contact Riaan Stals at the National Collection of Insects. Clear photographs via e-mail are very welcome. Otherwise, put the beetles in a container into the freezer, and arrangements will be made when you contact Riaan Stals.

Contact: Riaan Stals at StalsR@arc.agric.za or Telephone (012) 304-9580.



Southern African distribution of the harlequin lady beetle as of September 2008

Specimen from Woodstock

Edenvale

Biosystematics

Spinoffs of the International Congress of Entomology

ICE a catalyst for bees and pollination science

During the International Entomological Congress (ICE) about 75 talks and numerous posters were presented on pollinators and pollination related subjects, such as pollinator/plant interactions. At a session organised by Drs Carolin Meyer (from Germany) and Connal Eardley (from ARC, South Africa) the introduction of a scientific journal dedicated to pollination was proposed by Carolin. This is an indication of the importance of pollination to agriculture and biodiversity conservation.

The formal presentations at the Congress were a mere drop in the ocean in relation to all the stimulating informal discussion and research partnerships developed. For example, ICE was a catalyst for holding the Global Pollination Summit near Durban (see separate contribution below), the inclusion of African stingless bees, as a priority group, in the Bee Barcode of Life (BEE-BOL), which is a collaborative project involving many African countries and Canada. A number of scientists either arrived early or stayed later to discuss their research and to develop collaboration on projects. And last but not least, many people took the opportunity to take a short holiday in our beautiful country, and many of them plan to come back. Some of the scientists intend studying our bees and pollination systems in future.

Contact: Dr Connal Eardley at EardleyE@arc.agric.za

The Global Pollinator Summit

Dr Connal Eardley, a bee taxonomist at ARC-PPRI, helped organise a three day Global Pollinator Summit during 1-4, July 2008 at Tala Nature Reserve, near Durban. This Summit was designed to bring together scientists who were proceeding to the ICE, in Durban the following week, to discuss how to conserve and sustainable manage essential ecosystem service of pollination.

A total of 35 United States, sub-Sahara African scientists, post-doctoral and graduate students and international bee scientists assembled for the summit. A variety of research initiatives in bee science were represented. Major programs being the African Pollinator Initiative (API), the Consortium of the Barcode of Life (CBOL), the International Barcode of Life (iBOL), the Global Pollinator Species Campaign (GPSC), the Integrated Taxonomic Information System (ITIS) and the Global Biodiversity Information Facility's (GBIF) Global Pollinators Species Campaign (GPSC). These initiatives had different but complementary and overlapping goals, stemming from the central role that taxonomy plays in each of them, and their concern for declining bee populations. The Summit took advantage of the convergent goals of the three principal sponsors: GPSC, CBOL and the National Science Foundation (NSF).

The Summit brought together pure and applied scientists, taxonomists, ecologists and specialists involved in DNA-based methods and database management. Participants discussed shared goals, challenges and opportunities in bee science. Mechanisms to foster interaction to improve pollinator biodiversity conservation were proposed and collaborative research projects were identified.

These included:

- Overcoming the taxonomic impediment.
- Developing sustainable stingless bee-keeping in Africa.
- Providing data on the status of pollinators.
- Assessing the value of pollinator services.
- DNA barcoding pollinators of cocoa, *Xylocopa* and stingless bees of Africa.

At the Summit they also discussed an agenda for improving bee collections in Africa. The goals for GSPC are to develop:

- A detailed plan for a global campaign to acquire and disseminate taxonomic and collections data and information on pollinators that will be useful for a variety of conservation and scientific applications.
- Specific plans for using data and information. First to build and maintain a World Bee Checklist that contains all valid species names, synonyms and common names. Second, to assist in the identification of pollinator species. And third, to help determine the status and trends of pollinators.

CBOL's goals for the Summit were to:

- Promote global participation in the Bee Barcode of Life Initiative(BeeBOL).
- Expand the participation of African researchers and initiatives in BeeBOL.
- Promote DNA barcoding as a standard practical and reliable approach to pollination–related specimen identification for taxonomists and non-taxonomists in Africa and elsewhere.
- Identify applications of DNA barcoding in bee pollination research, and initiate planning and implementation of projects in pollination in Africa and elsewhere.
- Create mutually beneficial partnerships with API, GSPC and other initiatives and institutions in Africa.

Contact: Dr Connal Eardley at EardleyE@arc.agric.za

Delegates attending the Global Pollinator Summit

Biosystematics (continued)

The Global Pollinator Summit (continued)

NSF's goals support the research needs and interests of the Summit's participants and major themes. Specifically, the goals of NSF are to:

- Facilitate knowledge exchange between US and African-based bee scientists.
- Promote the development of joint research projects, taking into consideration the Action Plans developed by the API in 2002.
- Build communication linkages between US and Africa-based scientists working on bee research using existing Africa based networks, such as BioNET's African networks (SAFRINET, EAFRINET, WAFRINET and NAFRINET), API and the African Regional Postgraduate Program in Insect Science (ARPPIS).
- Identify common problems and challenges for which shared solutions and approaches can be useful.
- Initiate the process of developing integrated research strategies, work processes and intellectual interchange of mutual benefit to US and sub-Sahara African scientists.
- Arrange the groundwork for future exchange visits between African and US laboratories.

Contribution by Lucie Rogo, Smithsonian Institution, USA.

Contact: Dr Connal Eardley at EardleyE@arc.agric.za

ARC-PPRI hosts 7th International Chrysomelidae Symposium

The 7th International Chrysomelidae Symposium was one of many events successfully concluded during the ICE 2008. Chrysomelidae, commonly known as 'leaf beetles', form one of the largest groups of beetles and play vital roles in natural ecosystems. On the downside, some are agricultural pests, but several other species are excellent biological control agents of invasive alien plants.

The Durban Symposium was the latest in a series of such specialist symposia, and the first to be held in Africa. The Symposium was co-convened by Beth Grobbelaar of PPRI's National Collection of Insects (Pretoria) and Michael Schmitt of the *Zoologisches Forschungsmuseum Alexander Koenig* in Bonn, Germany. Leaf beetle specialists from ten countries around the world were drawn together for this Symposium, and a remarkable private leaf beetle researcher from Durban also attended.

The specialist contributions comprised ten oral presentations and three poster presentations. A diverse range of topics relating to leaf beetles were discussed, including biogeography and regional biodiversity, phylogeny, structural and behavioural peculiarities, and specialised biologies. After the Symposium, a productive workshop was held.

The various contributions presented by this international group of leaf beetle specialists are to be published as the next volume of the significant book series *Biology of Chrysomelidae*. This volume will be edited by Beth Grobbelaar and Michael Schmitt.

Contact: Beth Grobbelaar at GrobbelaarB@arc.agric.za

Beth Grobbelaar presenting her research at the International Chrysomelidae Symposium (photo by Michael Schmitt)

An indigenous South African leaf beetle (photo by Beth Grobbelaar)

Kwanunu — 'Place of the Animals'

The XXIII International Congress of Entomology, was unquestionably a major event for African entomologists, but probably meant less to the general public. Hence, during the Congress, an interactive exhibition—"Kwanunu"—was presented to everyone from preschoolers to school leavers, parents and teachers. The exhibition was a combined venture between the Durban Natural Science Museum and the School of Biological and Conservation Sciences, University of KwaZulu-Natal, but the PPRI's National Collection of Insects (SANC) was expressly invited to make a contribution.

The themes of the SANC exhibition were "Let's do Composting" and "Who is Who in the Compost Zoo", which fitted well into the overall exhibition. Elmé Breytenbach coordinated the SANC's exhibition in Durban. It was a scaled-down version of the SANC's original exhibition presented last year at the annual "Yebo Gogga" exhibition at the University of the Witwatersrand. The Kwanunu organizers aimed to promote broad public awareness and understanding concerning the Natural Sciences and to present Science in a fun way. The SANC's contribution was very well received (see next page for photograph of display).

Contact: Elmé Breytenbach at BreytenbachE@arc.agric.za or Ros Urban at UrbanR@arc.agric.za

Biosystematics (continued)

Elmé Breytenbach at the ARC-PPRI stand at the Kwanunu Exhibition

Visitors at the National Collections of Insects and Arachnida

Before and after the International Congress of Entomology, held in Durban in July 2008, a number of colleagues from foreign countries paid longer or shorter research visits to the South African National Collection of Insects (SANC) and South African National Collection of Arachnida (NCA) in Pretoria.

Dr. Tetsuo Gotoh of the Laboratory of Applied Entomology & Zoology, Faculty of Agriculture, Ibaraki UniversityAmi, Japan, **Prof. M. Khanjani** and **Dr M. Kazzazi** of the Bu Ali-Sina University, Hamedan, Iran visited Dr Eddie Ueckermann at the NCA (Mite Unit) from 14-17 July 2008 to exchange mite information and discuss future publications.

Dr Tetsuo Gotoh, Eddie Ueckermann (back), Tinyiko Chauke* (front), Dr M. Kazzazi, Prof M. Khanjani , Charnie* Craemer and Tshidi Makutoane* (*ARC-PPRI)

Prof. Sebahat Ozman-Sullivan from the Ondokuz Mayis University, Faculty of Agriculture, Turkey, visited Charnie Craemer at the Mite Unit to talk about the biosystematics of plant feeding mites, in particular of the Eriophyoidea. They also discussed future cooperation and potential projects and Charnie Craemer assisted Sebahat in problematic identifications of some eriophyoid species.

Charnie Craemer and Prof Sebahat Ozman-Sullivan

Dr David G. Furth is the Entomology Collections Manager at the US National Museum of Natural History (Smithsonian Institution), Washington, D.C., USA. Besides invaluable discussions on leaf beetle taxonomy, he shared some of his expertise concerning moving large insect collections. This was well timed with the SANC's imminent move to the new biosystematics facilities at Roodeplaat.

Dr David G. Furth with Ros Urban left and Beth Grobbelaar right

Dr Thomas Wagner of the Koblenz-Landau University, Germany, is a specialist taxonomist on the leaf beetle subfamily Galerucinae and a long-standing collaborator of Beth Grobbelaar of the SANC. Apart from generously sharing his expertise on these beetles, he worked tirelessly in the SANC for two and a half days, making extremely valuable contributions to upgrading our leaf beetle collection.

Tomáš Lackner PhD student in the laboratory of Prof. Masahiro Ôhara at the Hokkaido University Museum, Japan, studies certain clown beetles (family Histeridae), a rather difficult group of insects. During his visit, he was delighted to discover in the SANC beetle collection a good number of specimens belonging to a desert-adapted histerid genus that is poorly represented in collections and known from few specimens worldwide.

Biosystematics (continued)

Dr Jim O'Hara of Agriculture and Agri-Food Canada, Ottawa, is a specialist of the systematics of the family Tachinidae, an important group of mostly parasitoid flies. He is involved in an ambitious project cataloguing the world Tachinidae (a large family) in detail. The aim of his visit was to check the Tachinidae type specimens in the SANC to ensure that they are correctly cited in the forthcoming catalogue.

Dr Jim O'Hara with Elmé Breytenbach

Dr Pat Bouchard also hails from Ottawa, Canada, but is based at the Canadian National Collection of Insects, Arachnids and Nematodes. He researches various beetle groups and their nomenclature, but with his visit to the SANC he focused on particular darkling beetles (family Tenebrionidae, which is spectacularly species-rich in southern Africa). He flagged a number of these beetles in the SANC for possible future borrowing. Discussions with him were most insightful, as his organisation in Ottawa is very similar to the Biosystematics Division of ARC-PPRI—we face much the same difficulties and enjoy many of the same opportunities.

Dr Pat Bouchard working in the SANCI

Contact: Ros Urban (SANC Collections Manager) at UrbanR@arc.agric.za

Dr Johanna (Jo) Darlington of the Department of Zoology at the University of Cambridge, UK, has an uninterrupted research career spanning nearly 40 years. Dr Darlington specialises in the study of termite structures, populations and architecture and is the leading authority on termite construction techniques. She visited the SANC to glean information from the vast collection of *Odontotermes* (fungus-growing termites) samples housed there.

Dr Johanna (Jo) Darlington on the left, with local termite experts Vivienne Uys and Jannette Mitchell

Dr Simone Policena Rosa a postdoctoral researcher at the Zoological Museum of the University of São Paulo, Brazil, is currently involved in taxonomic research on a little-known group of click beetles (family Elateridae). During her visit to the SANC, she discovered a good number of these rather rare beetles, which she took along to Brazil for detailed study. Additionally, she rapidly became an invaluable intermediary between the SANC beetle researchers and some of their counterparts in Brazil.

Previously a staff member of ARC-PPRI in Pretoria, **Tharina Bird** is now employed as Curator of Arachnida and Myriapoda at the National Museum of Namibia, Windhoek. She paid the SANC a short visit to discuss collaborative matters. She also visited the NCA Spider Unit to work through their Solifugae collection to obtain information for her PhD degree dealing with the family Solifugidae.

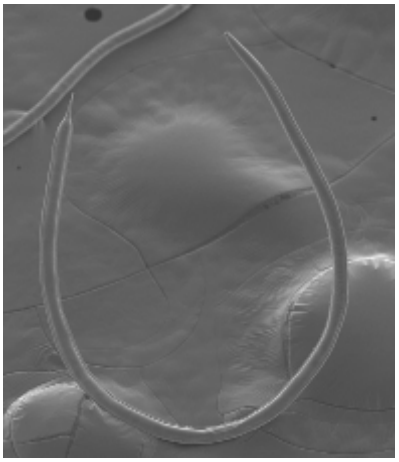
Biosystematics (continued)

First record of awl nematode Dolichodorus miradvulvus from sugarcane

During a routine nematode survey by Dr S Berry (SASRI, Mount Edgecome) of a cultivar x nematicide field trial near New Guelderland, KwaZulu-Natal, an awl nematode (*Dolichodorus* sp.) was found. Comparative light and scanning electron microscope studies identified the species as *Dolichodorus miradvulvus* Smart & Khuong. The population was compared with specimens collected from an indigenous forest in the Eastern Cape Province. The morphology and morphometrics of the population from sugarcane coincided with the population from the indigenous forest.

This is the first record of this nematode associated with sugarcane in both South Africa and the USA from where it was originally described. *Dolichodorus* species are ectoparasites that feed near the root tip. Normal growth of the root tip can be inhibited in the vicinity of the feeding site and the continual elongation of cells in the non-affected areas may cause the root to curve. On some plants, galls appear on the root tips and in extreme cases a root system with nearly no feeder roots and few, if any, secondary roots are formed.

Contact: Dr. Mariette Marais at MaraisM@arc.agric.za or Dr S. Berry at Shaun.Berry@sugar.org.za



Dolichodorus miradvulvus female: Scale bar = 400 µm

BEE-BOL, a global initiative and opportunity for the ARC

Bees, which are the most important pollinators of plants, are under threat. Honey bee populations are in trouble in many parts of the world, and the numbers of certain wild bee species are declining. This is bad news because not only are bees essential as pollinators, they are also good indicators of the state of the terrestrial environment. But there is a major impediment to the development of additional bee pollinators for crops and their use in environmental monitoring; the more than 20,000 species are extremely difficult to identify.

To help resolve the taxonomic impediment, a campaign to barcode the bees of the world, involving DNA-based identification methods, was initiated at a meeting held at York University in Toronto, Canada in May 2008.

The following countries were represented: Argentina, Australia, Brazil, Canada, China, India, Japan, Mexico, South Africa (Connal Eardley via telephonic conferencing), UK and USA, with a representative of the FAO also contributing.
Already over 1500 species of bee have been barcoded, including several South African species, and the results indicate that there are many cryptic species that have hitherto gone unnoticed. The data also suggest that a large proportion of previously synonymised species are valid and require reinstatement.

This approach promises to revolutionise our understanding of bee taxonomy. Furthermore, because most bee experts are interested in furthering the world's knowledge of these important organisms, combining DNA barcodes with traditional morphological approaches is likely to be particularly effective. The international Barcode Of Life campaign (iBOL) aims to fund pollinator taxonomy as part of a worldwide initiative to barcode our planet's organisms. This has the potential of putting biodiversity studies on the map as being as being almost as well funded as big physics projects.

Contribution by Laurence Packer, York University, Canada.

Contact: Dr. Connal Eardley at EardleyC@arc.agric.za

Delegates at meeting held at York University in Toronto, Canada

International Congress of Plant Pathology

Dr Elna van der Linde, a researcher in the Mycology Unit, Biosystematics Division,attended the International Congress of Plant Pathology in Torino, Italy from 24-29 August. She also attended an International Fusarium Genomics Workshop at Alghero, Italy from 30 August-2 September 2008. Both the congress and workshop were very informative and topics not only contained information on fungal taxonomy, basic plant pathology and molecular techniques, but also covered biosecurity and biosafety as well as training in plant pathology.

It was an extremely full programme with 12 parallel sessions and lectures were given until 20h00 during some evenings. However, there was still enough time for interaction with other attendants.

More information on the congress and abstracts can be obtained from: Dr Elna van der Linde at VDLindeE@arc.agric.za

Biosystematics (continued)

Newly recorded alien wasp in the South Western Cape

In February 2008 Alan Wood, a researcher at ARC-PPRI, found the alien wasp species *Polistes dominulus* (Christ) nesting in his house near Cape Town. So far, this is the only record of this species in South Africa. The wasp *P. dominulus* is indigenous to Europe, and during the past two decades it has become established over a large part of the USA. We can therefore assume that it has the capability to establish itself in other foreign countries as an alien invasive species, including South Africa. Anyone who finds a nest here should destroy it. But, as these waps sting and can be dangerous, an expert should be employed for this task. To spray them with an insecticide when it is cold and dark would be the safest method.

Polistes dominulus can be readily distinguished from the indigenous Vespidae wasp species occurring in South Africa (three genera occur here - *Polistes, Rhopalidia* and *Belonogaster*), which are all brown and usually have pale maculation. *P. dominulus* is black with distinct yellow maculation. In colour it resembles the European wasp, *Vespula germanica* (Linnaeus), which is an alien invasive species already present in South Africa. These two alien wasps differ in the patterns of their yellow and black colouration. In *P. dominulus* the first gastral segment gradually expands from the petiole whereas in *V. germanica* the anterior region of the first gastral segment expands abruptly and then curves sharply into the subhorizontal posterior region. Also, *P. dominulus* nests above ground, whereas *V. germanica* has subterranean nests, and these may contain several thousand individuals. They are therefore much more dangerous than any of the other paper wasps in South Africa, and should definitely only be exterminated by an expert.

Good pictures can be seen in Wikipedia at: (http://en.wikipedia.org/wiki/Image:IC_Polistes_gallicus.JPG, http://en.wikipedia.org/wiki/German_wasp).

If you find any specimens of *Polistes dominulus*, you may send them to Dr Connal Eardley at ARC-PPRI, Private bag X134, Queenswood, 0121 Pretoria. This will help us understand the extent of the establishment of this species in South Africa.

Specimen of *Polistes dominulus.*
Source:
http://commons.wikimedia.org/wiki/Image:FeldWespen_1.JPG

5th Citrus Research Symposium

Mariette Truter, a researcher in the Mycology Unit, Biosystematics Division, attended the 5th Citrus Research Symposium at Champagne Sports Resort, Central Drakensberg, KwaZulu-Natal from 3 to 6 August 2008. The Citrus Research Symposia are held on a bi-annual basis and were hosted by Citrus Research International (CRI). They provide an opportunity for researchers to report back on research conducted for the southern African citrus industry during the previous two years, and especially on projects funded by CRI.

Mariette presented a talk titled: “Recent advances in citrus black spot research”, which was based on research conducted for her PhD study at the University of Pretoria under the supervision of Prof. Lise Korsten. The three-day symposium was attended by 410 delegates, representing a wide range of specialists and organizations: citrus producers and their technical staff, citrus consultants (SASCCON), exporters, the citrus nursery industry (SACNA), Citrus Cold Chain Forum (CCCF) which includes packhouses, the paper and carton manufacturing companies, PPECB and logistics, the chemical industry and delegates from other related industries.

The different sessions covered a broad range of topics relating to citrus production, from trends in the citrus industry, integrated pest management, rind conditions, crop and fruit quality, various diseases such as greening, graft transmissible diseases, citrus black spot and other disaeses, post-harvest handling and cultivar development and evaluation.

Contact: Mariette Truter at TruterM@arc.agric.za

Lemon with citrus black spot

Congratulations

Dr Ansie Dippenaar-Schoeman has been appointed as the new General Secretary on the Executive Committee of the Royal Society of South Africa.

Biosystematics (continued)

Visitor to the Spider Unit

Dr Tony Russell-Smith of the UK visited the Spider Unit from 10-24 August 2008. His visit was funded through the SANSA project. This is one of the Threatened Species projects of the South African National Biodiversity Institute (SANBI). He assisted with the identifications of the spider families Lycosidae and Linyphiidae. These are two difficult families, of which there are a large number of specimens in the NCA.

Dr Tony Russell-Smith hard at work

During Tony's visit a lecture series was organized at the ARC-Central Office. Three lectures were presented to about 40 interested people from the ARC, University of Pretoria and SANBI. The titles of the lectures were:

RUSSEL-SMITH, T. & DIPPENAAR-SCHOEMAN, A.S. Spiders the farmers' best friend.

DIPPENAAR-SCHOEMAN, A.S. The South African National Survey of Arachnida (SANSA).

HELBERG, L. & DIPPENAAR-SCHOEMAN, A.S. AFRAD the online databases available to the public. (live demonstration)

Contact: Dr Ansie Dippenaar-Schoeman at DippenaarA@arc.agric.za

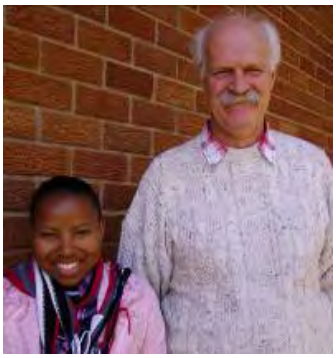
Dr Ansie Dippenaar-Schoeman (back) Solly Nkoana (front) the manager of the Threatened Species Programme at SANBI, Louise Helberg (ARC systems developer), Suvarna Parbhoo (Threatened Species Programme at SANBI), Dr Tony Russell-Smith and Dr Rami Kfir (ARC-PPRI Research Institute Manager)

Courses

Mite course

Andiswa Mbontsi from the Plant Quarantine Station in Stellenbosch visited the Mite Unit from 1-3 September 2008 to attend a course in identifying the most important quarantine mite families.

Contact: Dr Eddie Ueckermann at UeckermannE@arc.agric.za



Weedy technician trained at Vredehuis

Reléy Labhan is a technician at the Weeds Research Division of the ARC-PPRI in Stellenbosch. One of her various tasks is the processing of biocontrol agent specimens to be sent to taxonomists for identification. Taxonomists have specific requirements about how different kinds of organisms have to be prepared, since they cannot work with incorrectly preserved or poorly mounted specimens. Nowhere in South Africa can better advice on these requirements be found than at the Biosystematics Division of ARC-PPRI. At the request of the Weeds Research Division, Reléy recently received a tailor-made training course at the National Collection of Insects at Vredehuis, Pretoria.

The insects Reléy most often have to prepare just happen to be notoriously difficult to process correctly—small weevils (that usually refuse to let their legs be spread); even smaller little moths (that usually refuse to let their wings be spread); and really tiny gall midges (so small they easily disappear on your work surface). All these are existing or potential biocontrol agents for various invasive plants, mostly woody invasives in Western Cape habitats.

In August 2008, Elmé Breytenbach, research technician at Vredehuis, gave Reléy hands-on training in the intricacies of correctly preparing, mounting and preserving these and other insects. They also paid attention to the special packaging necessary for mailing specimens, and Elmé shared the ins and outs of good curatorial practice with Reléy.

As one would expect, Reléy was shown around the magnificent collections at Vredehuis, which can only inspire any biologist.

Contact: Elmé Breytenbach at BreytenbachE@arc.agric.za

Reléy Labhan

Biosystematics (continued)

Taxonomists learn how to use new tools

In the past, many taxonomists were possibly guilty of taking a back seat in high tech science, being happy to use just a microscope and doing specimen collection, which were the basic tools needed to methodically grind away at documenting our biodiversity. But things have changed. Biologists in applied disciplines, like agriculture, are making a case for more taxonomy, as they realize how it underpins fundamental science. Their needs, and the decreasing number of taxonomists, raises the demands on a small compliment of highly skilled scientists, and creates new challenges for them. Global trends also introduce new standards that our taxonomists must meet. Therefore, even the taxonomists need to learn new tricks in this ever changing World. The South African National Research Foundation (NRF) has recognised this need and has embraced the development of taxonomy. To promote this aim, they have a special programme - the South African Biosystematics Initiative (SABI).

Last year SABI financed two training courses in the development of electronic interactive keys, and today a number of “LUCID” computer keys for the identification of our fauna and flora are being developed.

Although new microscopes and digital photography are extremely valuable taxonomic tools, illustrations remain a very important part of taxonomic publications. To produce diagrams, taxonomists around the World are beginning to use computer assisted drawing programmes to produce professional looking illustrations that are immediately ready for publication. Drawing in this way requires a lot of skill, but once acquired, drawings can be easily altered, duplicated and are perfectly symmetrical, and for structures that taxonomists use to separate species, like pores and hairs, a database of illustrations of structures can be created to speed up the process.

A group of South African taxonomists, with financial support from NRF, agreed to embrace this technology and participated in an Adobe Illustrator course organised by Dr Connal Eardley, from ARC-PPRI. The course was held in the outstanding training room at ARC-CO, and attended by taxonomists from the Biosystematics Division of ARC-PPRI, several local museums, and by botanists from the National Herbarium in Pretoria.

This is by no means the end of the road for taxonomists to develop their new tool kits. Computer technology for mapping distribution and publishing on the web needs to be used, and further training in the use of the software is planned for interested taxonomists.

Group 2 of the Adobe Course

IUCN Red listing workshop

SANBI's Threatened Species Programme hosted a Red List Training workshop to boost Red Listing knowledge and experience in Southern Africa from 14-16 July 2008. The workshop covered theoretical and practical aspects of producing Red List assessments for birds, reptiles, plants, butterflies, fishes, and other organisms. Participants received hands-on training and supervision on how to gather data and create assessments and how to deal with the problems commonly associated with Red Listing in South Africa.

The workshop was attended by Dr Ansie Dippenaar-Schoeman and Petro Marais. As part of the South African National Survey of Arachnida, conservation assessment need to be undertaken in order to meet the goals of conserving the arachnid biodiversity. It is important to identify those species in need of directed conservation action. Species are prioritized according to their risk of extinction as evaluated against a set of standardized criteria developed by the IUCN . This process will result in the publication of a formal red list, which will then be available to a range of user groups.

Contact: Dr Ansie Dippenaar-Schoeman at DippenaarA@arc.agric.za

The shield-bum spider (Idiopidae *Galeosoma* sp.) that might be at risk. (photo by Pieter Roos)

International Barcode of Life -Workshop

The International Barcode of Life South Africa Regional Node Workshop took place on the 3rd of September 2008 at the National Zoological Garden, Pretoria. It was attended by several researchers of the Biosystematics Division. At the workshop several presentations were made including one by Ian Millar.

MILLAR, I.M. 2008. The Scale Insect Barcode Initiative.

Insect Ecology

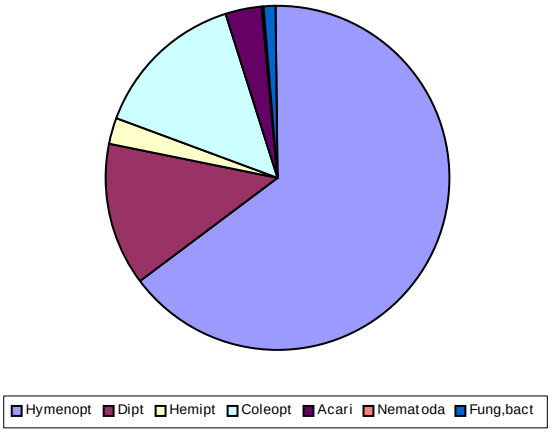
Some interesting data regarding biological control in South Africa (1892-2008)

The first attempt at biological control in South Africa was in 1892 when a coccinellid, *Rodolia cardinalis*, was imported from Australia for the control of the Australian bug, *Icerya purchasi* on citrus. It was highly successful. Since then 210 additional species have been imported against 52 insect pests of cultivated crops such as citrus, wheat, cotton, plantation trees, fruit and vegetables. Of these, 142 (67,5%) were released of which 49 (22, 7%) became established and a further 24 (11,4%) were recovered in low numbers. Some imported species could not be reared successfully and died in quarantine and for some there are no further information available.

Most imported species belonged to the order Hymenoptera (64,5%) followed by Coleoptera (14,7%), Diptera (13,7%), Acari (3,3%), Hemiptera (2,4%), fungi and bacteria (1%) and Nematoda (0,5%). The most successful species were aphelinids where 71.4% of imported species became established followed by coccinellids with 33, 3% establishment. The most successful biological control projects were on citrus, forestry and wheat.

Contact: Leonie Pretorius at PretoriusL@arc.agric.za

Percentage of imported species in each group



The potentially negative impact of a diamondback moth trap crop

One of the important components of an Integrated Pest Management programme is trap cropping, which is based on planting strips of a different plant next to the main crop. A trap crop ought to be more attractive than the main crop to gravid females of the target insect pest, but unsuitable for the normal development of offspring. Thus, trap cropping works well where only the immature stages of the target insect pest feed on the crop. This system is widely used against many insect pests.

Investigations by the Insect Ecology Programme of ARC-PPRI on the relative attractiveness and suitability of various *Brassica* crops for diamondback moth (DBM) *Plutella xylostella* (L), a major pest of brassicas throughout the world, showed that Indian mustard [*B. juncea* (L.) Czern] has a potential to be used as a trap crop for DBM as it was highly attractive to the moths, whereas survival of larvae was low.

When Indian mustard was planted next to a cabbage field in a small-scale farm in Dennilton (Mpumalanga), DBM infestations were very low on the main crop and the moths were often seen hovering over Indian mustard, as predicted.

In addition to DBM, Indian mustard also attracted the Bagrada bug, *Bagrada cruciferum*, which is a key pest of *Brassica* crops in southern Africa. The population density of *Ba. cruciferum* (adults and nymphs) was very high on Indian mustard and virtually absent on the cabbage crop.

Other small-scale farmers that grow another Indian mustard variety called Florida broadleaf, which is sold as 'morogo', also complained about the high *Ba. cruciferum* infestations. Therefore, unlike the cabbage system where *Ba. cruciferum* is a sporadic pest, the presence of mustard plants appears to attract trouble. This undermines the trap cop idea for DBM.

*Brassica juncea (*Indian mustard) planted alongside cabbage

Some farmers have acknowledged that when their fields are free of Indian mustard, they stop having problems with *Ba. cruciferum* on cabbage. Unless *Ba. cruciferum* is properly controlled using economically and environmentally sound methods, the resulting higher infestations of *Ba. cruciferum* may reduce the importance of Indian mustard as a trap crop for DBM. For instance, should *B. juncea* be used up while the cabbage crop is still fairly young, this pest is likely to devastate the cabbage field.

Contact: Robert Nofemela at NofemelaR@arc.agric.za

Bagrada bug nymphs on *Brassica juncea*

Pesticide Science

Joint research grant under the South African & Swedish research partnership programme

A bilateral agreement on a joint research programme between researchers from ARC-PPRI and the Swedish University of Agricultural Science operating via the NRF resulted in the initiating of a new study on the "Level and implications of current-use pesticides in breast milk from KwaZulu-Natal". Both partners are cooperating with the North-West University (NWU).

The Division of Pesticide Science has undertaken similar projects before. However, the difference between these projects lies in a new approach of including pesticides not tested before and in sampling from an extended monitoring area. The presence of appreciable levels of DDT and pyrethroids in breast milk (previously detected) indicates the possible presence of other compounds (current use pesticides-CUPs) as well. Many of these have never been analysed before, despite their serious potential health impact on infants. The observed exposure profiles are also such that this kind of contamination is highly possible. The need for such information is critical in promoting the aims of the Stockholm Convention, and will feed into the assessments of alternatives to DDT.

PPRI's Pesticide Analytical Laboratory (PAL) is in the process of developing an analytical method for selected pesticides. For some pesticides, this will be the first such analysis done on human milk. Sampling has already been done in the Manguzi and Mseleni malaria endemic areas of KwaZulu-Natal and in Gwaliweni, which served as a reference area. Prior to the study, ethical approval was obtained. In total, 146 breast milk samples and questionnaires were collected from volunteer mothers. Cooperation with personnel from five identified local clinics as well as hospitals is acknowledged and highly appreciated.

Data will be analysed and interpreted, and preliminary risks identified. Since there are no MRLs (Maximum Residue Limit) or ADI (Acceptable Daily Intake) specifically determined for infants, a full risk assessment is not yet possible. Development of parameters mentioned above will be followed by the WHO. The results will be written up for publication, peer-reviewed, and then presented to governments and health authorities. The respective Stockholm Convention focal points in each country will also be informed of peer-reviewed data.

In the future it is planned to initiate investigations on possible health effects of the use of alternative compounds to DDT. This cannot be done within this project, but the data collected during the current study will be instrumental in directing the forthcoming research.

Contact: Barbara Sereda at SeredaB@arc.agric.za

Barbara Sereda with one of the babies

Ephraim taking down data

Group forming part of the beast milk study in KwaZulu-Natal

ARC-PPRI participate in SADC ICART Grantees workshop

As part of a project monitoring and evaluation process, the SADC Implementation & Coordination of Agricultural Research & Training (ICART) Project Coordination Unit organised a workshop to review progress of their collaborative Research and Training projects. This Review Workshop for SADC ICART Grantees started straight after the SADC Assembly, both of which were held at the Saint George Hotel, Centurion. Messrs Frikkie Kirsten, Emil von Maltitz, and Etienne van der Walt attended the ICART Grantees workshop from 18-19 September. They presented progress reports on the two SADC ICART grant-funded projects in PPRI, namely, the Ecorat project (Developing ecologically-based rodent management for the southern African region) and the Quelea EIA project (Environmental impact assessment of Quelea control operations in southern Africa and novel means of mass trapping for protein and income generation for poor people). The Ecorat project also had the honour of being one of three projects that was selected from the eleven ICART-funded projects, for presentation at the earlier SADC Assembly.

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Pesticide Science (continued)

Ecorat on track

The ICART/CRAFT-funded project 'ECORAT' has the aim to develop ecologically-based rodent management for the southern African region. The Ecorat team comprises six partners in five different counties. The project consists of three thematic and three cross-cutting workpackages, each managed by a partner. The practical field activities are executed in Tanzania, Namibia and Swaziland. (see Plant Protection News No. 71).

ARC-PPRI manages the work package "Rodent Impact Management". After the Knowledge, Attitude and Practice (KAP) surveys were conducted in the three field countries and the data analysed, the next phases consisting of on-farm participatory trials were started. "Assessing post harvest crop damage" and "Community based intensive trapping" were launched to coincide with harvesting of the staple crops in the respective field countries. At the end of June, Frikkie Kirsten and Emil von Maltitz along with project partners of the National Museum of Namibia visited the field sites in the Kavango Region in northern Namibia, while Phanuel Malebane and Steve Belmain (NRI-UK) travelled to meet up with the Sokoine University at Morogoro in Tanzania in July. The trapping activities in the third partner country, Swaziland, were launched when Steve Belmain, Phanuel Malebane and Emil von Maltitz visited the project collaborators at the University of Swaziland in April.

Rodent trapping and monitoring of rodent populations will be undertaken continuously over a period of one year. Four communities (villages) in each of the countries were selected to participate in the field activities. Two communities serve as the intervention sites, and were each divided into quadrants with intensive trapping carried out in each quarter, moving cyclically through the community. Trapping is done daily within the same households for an entire week before traps are relocated to the next quadrant, thereby rotating through all the households in the village on a monthly basis. The non-intervention villages, where no daily trapping is done, serve as the control.

In all villages, monitoring the effect of the continuous trapping is conducted in randomly selected households with the use of a limited number of traps and tracking tiles over a period of four successive nights per month. Tracking tiles are square ceramic tiles, coated in soot from paraffin lamps, and placed in households overnight. The monitoring tools are inspected daily, namely, the traps for rodent catches and the tracking tiles for foot prints or smudges caused by rats. Activity is scored and data recorded as a simple proportion of visited and non-visited tiles against the parameters intervention versus non-intervention villages. The tracking tile data gives an estimate of rodent abundance that is not influenced by neophobia and/or trap shyness.

Community level trapping data from Swaziland, after inception in April 2008, shows that communities have seen a 75% reduction in rodent population around their households after only five months of intensive trapping. (Fig. 1)

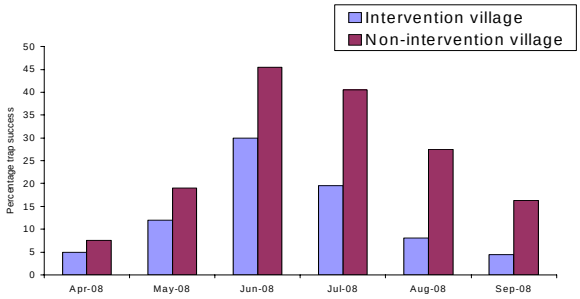


Figure 1. Rodent trap success at community level in Swaziland since April 2008

Monitoring of rodent damage and contamination of post-harvest staple crops in storage was also initiated during this winter period in the two countries. Weighed sacks of millet (Namibia) and maize (Tanzania), containing grain mixed with insecticides to minimise insect damage, were placed in grain stores of participating farmers in both intervention and non-intervention villages in the countries. With the sacks left open and the grain thus accessible to rodents, monthly monitoring of the sacks was done to measure the grain loss due to rodent damage as well as contamination due to rodent droppings. Initial results are also promising, indicating substantially smaller losses of grain to rodents as well as less contamination in the intervention villages compared to villages where no trapping is done (Fig. 2).

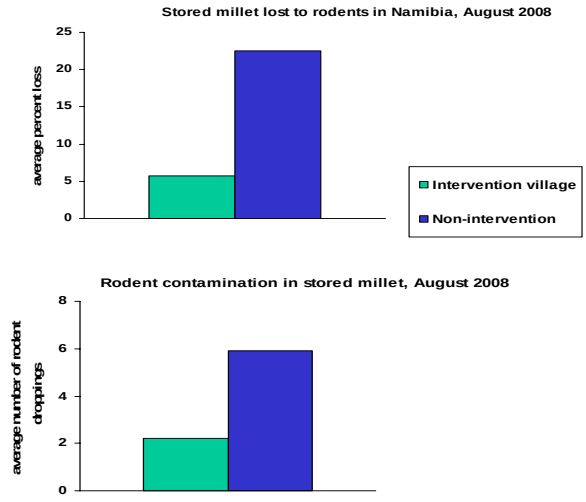


Figure 2. Millet loss and contamination due to rodent activities in grain storage in Namibia after one month post-harvest in 2008

Two pretty *Dendromus* climbing mice, standard décor of Kavango guest houses

Harvesting millet, the staple grain crop along the Kavango River in Namibia

Break-back kill traps to communities in Namibia

Monitoring of rodent activities with the use of soot-coated tracking tiles

Further information about the Ecorat project can be found through the website: http://www.nri.org/ecorat

Contact: Emil von Maltitz at VMalltitzE@arc.agric.za

Pesticide Science (continued)

Determining DDT in air and dust

The Laboratory was involved with determining the presence of DDT in air and dust samples (Venda), and developing a method for determining DDT and various other pesticides in mother's milk. Once completed, the latter method will be used to analyze pesticide residues in mothers' milk samples, especially for the NRF-funded project that is part of the Sweden / SA Research partnership Programme, with PPRI, the Swedish University of Agricultural Sciences, and NW University as the collaborators.

New senior analyst for the Pesticide Analytical Laboratory

Ms Lilla Primrose joined the Pesticide Analytical Laboratory in July 2008 as a senior pesticide analyst. She was transferred from the ARC Onderstepoort Veterinary Institute (OVI). Lilla started work at OVI in 2002, and became a laboratory analyst in 2003. In 2006, she became the Quality Manager at the Residue Laboratory at OVI. Lilla has much expertise in analytical work with HPLC and LC-MS, which will be strategically ideal for the Laboratory's critically required new direction. She has a B. Tech. in Chemistry (*cum laude*), and has started studying Laboratory Management. Welcome to the Lab Lilla!

Ms Lilla Primrose

Resignation by Ephriam Malinga ("Bafana")

Ephriam Malinga (also known as "Bafana") joined the Pesticide Science Programme of ARC-PPRI in September 1991 and re-signed in August 2008 after 17 years. Ephriam was specially noted for his quick smile and great helpfulness in many research matters, particularly field trips. Here he came into his own, and his excellence was realized by many researchers from several Programmes, with whom he was in much demand.

OBITUARY Mildred Zulu

Ms Mildred Zulu (*in memoriam*)

ARC-PPRI and especially the Pesticide Analytical Laboratory were shocked when **Mildred Zulu** suddenly passed away in September 2008.

Mildred (32) joined the Pesticide Analytical Laboratory in March 2006 as a Senior Pesticide Analyst. At her death she was in the final stages of completing her Btech in Chemistry.

Mildred was well acquainted with analytical equipment such as the Agilent GC-ECD/NPD and GC-MSD and had been a great help to the Laboratory in operating these highly specialized instruments.

She was mainly involved in the analyses of DDT and its metabolites in air and dust samples from the Limpopo region. She was also responsible for a number of infrastructure maintenance functions within the Good Laboratory Practice Quality System.

Mildred was a First Aid representative and often represented ARC-PPRI at NEHAWU on the NBF. Mildred was a soft-spoken, gentle and friendly person. Her quiet way of going about her duties and her kind smile will always be remembered.

ARC would like to extend their sincere condolences to her family and friends.

Ephriam Malinga

Weeds Research

Renewed biocontrol research on crofton weed (Ageratina adenophora)

Crofton weed (*Ageratina adenophora*), an asteraceous herb of Mexican origin, is invasive in Hawaii, Australia, New Zealand, China, India and South Africa. It was probably introduced into South Africa in the 1940s, and has since invaded stream banks, forest margins and cliff faces. It flourishes in wet, generally inaccessible areas in Gauteng, North West, Limpopo, Mpumalanga, Kwa-Zulu Natal and Western Cape provinces. Related to two major weeds, triffid weed (*Chromolaena odorata*) and pom-pom weed (*Campuloclinium macrocephalum*), this scrambling shrub similarly produces hundreds of thousands of wind dispersed seeds.

Finding an effective biocontrol agent is the preferred option, especially since the inaccessible, slippery areas in which it grows hamper mechanical and chemical control. Two biocontrol agents were introduced some 20 years ago. They are a stem-galling fly, *Procecidochares utilis*, and a leaf spot fungus, *Phaeoramularia* sp.. Unfortunately, neither of these agents causes sufficient damage to reduce the weed. Therefore, with funding from *Working for Water*, PPRI revived the biocontrol research project against *Ageratina adenophora* in 2007.

In August and September 2007, an exploration survey was conducted in Mexico, where a large variety of natural enemies are available that keep the plant's numbers in check. Several new potential biocontrol agents, comprising a fungus and 14 phytophagous insects, were collected with the assistance of Mexican colleagues at Universidad Nacional Autonoma de Mexico (UNAM). These were imported into the quarantine facilities in South Africa – the insects to the Rietondale laboratory in Pretoria, and the fungal pathogens to the laboratory at Vredenburg farm in Stellenbosch.

The insects were reared out from immature stages, and the adults were submitted for identification. Only two insect species were found in numbers sufficient for starting a colony in quarantine. They are now being examined for their compatibility with the South African crofton weed plants, for the amount of damage they inflict on the weed, and for their host specificity.

Thirty three fungal isolates have so far been tested, but none show any signs of pathogenicity to the locally occurring form of crofton weed. Studies are, however, continuing to improve the inoculation technique. This fungus has not been fully identified, but specimens have been submitted for taxonomic investigation and species confirmation.

The insect species currently being studied in quarantine are a leaf-mining hispine beetle and a gregarious leaf-chewing moth, which has been identified as *Lophoceramica* sp. The moth was the easier one to culture, and large populations were produced that have already allowed several studies to be conducted. Each female produces about 250 eggs in her adult lifespan of about a week. After a few days these eggs hatch to produce larvae, which feed in groups on the leaves. Later they become solitary feeders, cutting leaves and hiding in a leaf roll during the day while feeding at night, which enables them to escape predation from birds. The total development time from hatching to adult is about 55 days. Because of their high fecundity and voracious appetite, colleagues have likened them to goats. Preliminary indications from initial trials are that the moths restrict their development to their natural host plant, *A. adenophora*.

Several other highly damaging insects, including stem-boring curculionid beetles, a cerambycid beetle and a tip boring microlepidopteran moth, were observed in Mexico. However, the collected material yielded insufficient numbers of adults, because the larvae were so heavily parasitized in their native home. Another trip is therefore planned for February 2009 to collect large enough numbers of those species to allow further studies of their potential as biocontrol candidates.

Contact: Fritz Heystek at HeystekF@arc.agric.za

Flowering crofton weed

A leaf spot fungus observed on *Ageratina adenophora* in Mexico

Alan Wood, plant pathologist at PPRI, looking for candidate biocontrol agents on Mexican *Ageratina adenophora* plants

Larvae of the gregarious moth *Lophoceramica* sp. feeding on a crofton weed leaf

Weeds Research (continued)

Insect community in seed capsules of the River Red Gum, Eucalyptus camaldulensis*, in South Africa – and some lessons to be learnt*

The Australian River Red Gum (*Eucalyptus camaldulensis*) is the most widely distributed gum species in South Africa. Originally introduced as a timber species, its growth form soon proved to be unsuited for this purpose, and today it is used mainly as shelter, fuelwood and ornamental tree on farms in the warmer, arid parts of South Africa. Like all *Eucalyptus* spp., it is also an extremely valuable source of nectar and pollen for honeybees, to the extent that the pollination of deciduous fruit in the Western Cape Province of South Africa is completely reliant on the presence of large numbers of gum trees.

On the negative side, wherever it was planted near watercourses, River Red Gum has invaded riparian habitats, particularly in the Western Cape Province, to the detriment of the environment, biodiversity, hydrology and the structure of the watercourses.

One way of resolving this conflict in interests was the initiation of a PPRI research project, funded by the *Working for Water* Programme, into the potential use of host-specific insects that might reduce seed production in the invasive *Eucalyptus* species in South Africa. The aim was to reduce the invasive potential of the trees whilst still allowing for their utilization, especially for the beekeeping industry. This research project revealed the presence in South Africa of five minute chalcidoid wasp species, probably of Australian origin, associated with galls in the seed capsules of *E. camaldulensis.*

When the project was initiated during 2003, only one of the five wasp species (*Quadrastichodella nova*) (Eulophidae: Tetrastichinae) had been described and named, but two more have since been described by international taxonomists. They are *Megastigmus zebrinus* (Torymidae: Megastigminae) and *Leprosa milga* (Eulophidae: Terastichinae). The remaining two species are an undesribed *Aprostocetus* sp. and a representative of an as yet undescribed genus (both Eulophidae: Tetrastichinae).

The aims of the research project were to detrmine (a) which of the five wasp species induced the galls, (b) which role each of the other species played, and (c) whether the gall inducer had the potential of reducing the invasiveness of River Red Gum significantly.

Although the research has not yet been completed, the indication is that *Q. nova* is the gall inducer and that the larvae of *L. milga* feed externally on the larvae of *Q. nova.* It is not yet clear what the role of *M. zebrinus* is, but there is reason to believe that it, too, parasitizes the larvae of *Q. nova.* The other two species are far less abundant, and seem not to be permanent inhabitants of the seed capsule galls of River Red Gum. These biological roles should become clear once the results of DNA sequencing, which is currently underway, become available. Gudrun Dittrich, a PhD student at FABI, University of Pretoria, is carrying out this part of the study on our behalf.

The contents of the seed capsules of eucalypts normally consists of large numbers of infertile chaff particles, with relatively few seeds in between. During this study it was found that capsules with one insect gall contained rarely more than one or two viable seeds, whereas capsules that had more than one gall (up to seven galls per capsule have been recorded) contained no viable seeds. In contrast, there could be a maximum of six seeds per capsule in un-galled capsules. It is not yet known whether the effect of gall forming on seed production in River Red Gum is influenced by the presence of the other four insect species in the gall.

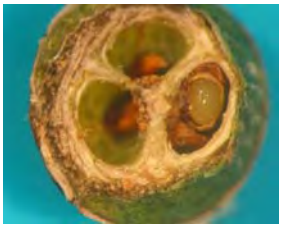
Even if the level of seed reduction in River Red Gum in South Africa is not improved by this project, the knowledge generated by this study can be applied to future biocontrol projects on invasive eucalypts. Some lessons for biocontrol researchers to be learnt from this research are the importance of undertaking a proper study in South Africa of insects present on invasive plants targeted for biological control, before surveying for new ones in the country of origin, and a reminder not to assume that any insect emerging from a gall is necessarily the gall inducer. The fact that the gall inducer in this study emerged from the galls only during a short, two-month period of each year, whereas some of the other species could emerge throughout the year, serves as a warning that surveys for potential biocontrol agents have to be timed very carefully.

Note that none of the insects mentioned in this article was intentionally introduced into South Africa, e.g. as a biocontrol agent. Because the galls in which they develop, are so similar to eucalypt seeds, the insects were most probably brought into the country unintentionally in seed lots intended for forestry purposes. This is one more indication of the importance of phytosanitary measures when plant material is imported into the country.

Contact: Hildegard Klein at KleinH@arc.agric.za

River Red Gum

A seed capsule showing an insect emergence hole



Section though seed capsule, showing an opened gall with developing wasp larva inside

Seeds (right), chaff particles (lower left) and an insect gall (upper left). The galls are easily included in seed lots for afforestation, and distributed in this way

Quadrastichodella nova, *Megastigmus zebrinus* and *Leprosa milga*

Weeds Research (continued)

Visit by Keith Warner

Dr Keith Warner, a social scientist from the Environmental Studies Institute, Santa Clara University, California, visited ARC-PPRI during June 2008 while on his way to the International Congress of Entomology in Durban. This visit was funded by a US National Science Foundation award to study the ethics and values in classical biological control practice and policy. This took the form of an international comparison of practices and policy, in the US, South Africa and New Zealand.

While in South Africa, Keith interviewed biocontrol researchers (representing the biological control of both insect pests and weeds), practitioners, critics, clients, and regulators. Those of us who spent time with Keith, benefited as much from his visit as he did. His thorough knowledge and understanding of all aspects of biological control, including the South African biocontrol projects, was impressive, and his insights into problems that we have in common with other countries as well as uniquely South African aspects have been extremely valuable.

One of the highlights of his time in Pretoria was a field visit to Rust de Winter, where a Working for Water team, managed by Ms Julia Modise, were harvesting and redistributing biocontrol agents for queen of the night cactus (*Cereus jamacaru*).

Contact: Hildegard Klein at KleinH@arc.agric.za

Keith Warner interacting with the Working for Water team at Rust de Winter

New appointments

Wilma Bester

In June 2008, Wilma started her career with the Weeds Research Division at Vredenburg, Stellenbosch. Her projects involve finding and examining pathogens to be used against inkberry (*Cestrum parqui*), parthenium *(Parthenium hysterophorus*) and stinkbean (*Paraserianthes lophantha*).

Wilma received a B.Sc.Agric degree in 2003, majoring in Plant Pathology and Genetics. In April 2006 she was awarded her M.Sc.Agric degree in Plant Pathology, with a thesis titled *Characterisation and management of trunk disease-causing pathogens on table grapevines*. Both degrees were awarded by the University of Stellenbosch.

Previously, Wilma worked as a consultant in the Plant Disease Diagnostic Clinic at the University of Stellenbosch (Department of Plant Pathology). This included processing plant samples, identifying plant pathogenic fungi, oomycetes and bacteria, as well as writing disease diagnostic reports and recommendations for disease management.

Anthony King

Anthony was employed in June of this year by the Weeds Research Division at Rietondale, Pretoria and will be involved in revitalising the biological control programme against cat's claw creeper along with Lulu Madire. Future work will involve the release and post-release evaluation of three new agents approved for release against the weed. These promising agents include two species of lace bugs and a leaf mining buprestid that together cause widespread leaf chlorosis and premature leaf absicion. Anthony will also become involved in the floating aquatic weed research, and will be conducting pre-release evaluations into the interactions between the water hyacinth grasshopper, *Cornops aquaticum*, and the other water hyacinth agents prior to its release.

Anthony has completed his MSc degree at Wits University on the effects of temperature and microclimate on the biological control of water hyacinth in South Africa. His research forms part of a larger project under the auspices of the Water Research Commission, tasked with developing a country- wide management strategy for the weed. The project has investigated both the role of climate and water nutrients on the efficacy of biological control in order to supplement this management strategy with herbicidal intervention.

Plant Pathology and Microbiology

Bananas, Peppers And Tobacco: Routine Virus Testing

When it comes to virus control prevention is the only option. The ultimate goal in plant virus disease control is therefore to prevent virus spread by either controlling the vectors or through the eradication of infected plants. To protect the interest of farmers, the agricultural industry, as well as national and international trade, it is important that nurseries and tissue culture laboratories provide healthy virus free propagation material. Plants such as mother plants, seedlings and sometimes seed used as propagation material should be tested for viruses before it is supplied to farmers or other nurseries. The virus status of plants can only be established by expert diagnostic procedures, such as that offered by the Virology unit at ARC-PPRI.

ARC-PPRI-Virology offer a plant virus diagnostic and indexing service to identify any plant virus on any plant provided that we have the tested and optimized diagnostic test in place for the specific virus. Specific tests such as Enzyme-linked Immunosorbent Assay (ELISA) and Polymerase Chain Reaction (PCR) are most commonly used but Electron microscopy (EM) testing is also available. EM testing is used as a non-specific test to confirm the presence of a virus if no specific test is in place for that particular virus.

Currently ARC-PPRI provides a number of routine virus tests on a number of different crops. Crops that are tested weekly are bananas (*Musa* sp.) tested for Cucumber Mosaic Virus (CMV), peppers (*Capsicum* sp.) tested for Pepper Mild Mottle Virus (PMMoV) and tobacco (*Nicotiana* sp.) tested for Tobacco Mosaic Virus (TMV), all being serious threat to agriculture.

CMV is commonly found on bananas, has a wide host range and is transmitted by aphids and well as through cuttings used for propagation. Symptoms on infected plants are mottling and mosaic of leaves and flowers. Removal of diseased plants from plantations prevents further spread of the virus.

PMMoV spreads extremely easily through mechanical transmission. The virus is stable outside the plant host and can spread during transplanting of seedlings and normal crop maintenance. The virus can also spread through infected seed. Symptoms of PMMoV infected peppers depends on the specific cultivar infected. Plants infected at a young stage are stunted causing considerable yield loss. Leaves of PMMoV infected peppers turn yellow and become mottled. Infected pepper fruits show colour variations and malformation leading to a reduction in yield and marketable fruit.

TMV has an extremely wide host range and symptoms vary between hosts. Symptoms on tobacco include stunting, leaf discolorations and lower quantity and quality of the crop. Similarly to PMMoV, this virus is mechanically transmissible and extremely stable. This virus is also seed transmissible.

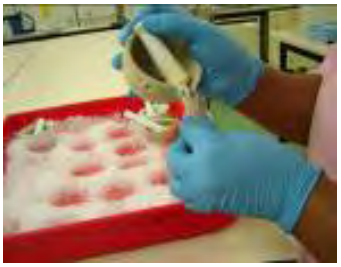
The routine virus indexings for these viruses are undertaken-weekly throughout the year. Plants testing positive can be eliminated and not used for further propagation or for seed production.

This indexing is an important, contribution towards the elimination of potential threats.

Contact: Marika van der Merwe at VDMerweMa@arc.agric.za

PROCEDURE

Samples arrive weekly in a variety of shapes and sizes.



Samples are prepared for testing

For ELISA testing (PMMoV and TMV testing), ELISA plates are coated with the relevant antibodies and for PCR testing (CMV) PCR tubes are also coated.

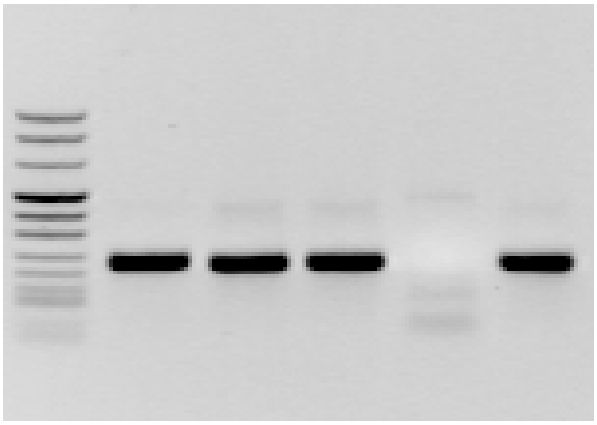
The PCR tubes and ELISA plates are washed and the samples (with all relevant positive and negative controls) are loaded for overnight incubation.

Plant Pathology and Microbiology (continued)

Routine Virus Testing (continued)

ELISA tests are completed to give a colour reaction, where yellow indicates a positive sample.

PCR tests are completed and run on a gel where a band indicates a positive sample . Results are reported to the clients as soon as the tests are completed



New appointment

Francina L. Phalane completed her MSc. in Microbiology on 15 July 2008 and graduated on 3 September 2008. She was appointed on 1 September 2008 as a Researcher in the Nitrogen fixation unit/ Beneficial microorganisms of the division Microbiology and Plant Pathology. Welcome Francina!

18th Annual Soilborne Diseases Interest Group Meeting and Soilborne Diseases Workshops 16-18 September

The 18th Annual Soilborne Diseases Interest Group Meeting took place in September. Dr Sandra Lampbrect and her colleagues at the ARC–Plant Protection Research Institute, Vredenburg Research Centre, Stellenbosch hosted this annual interdisciplinary symposium.

The opening and welcome was done by the ARC's CEO and President, Dr Shadrack Moephuli, after which Prof G. Abawi from Cornell University, USA presented the keynote address, discussing the connection between soil health and root health.

The theme of this year's symposium was *Soil health and Soilborne Plant Diseases* and delegates joined discussion groups focusing on various groups of soilborne pests and disease. Session themes included: soil health initiatives in South Africa, case studies, effect of soil health on soilborne plant diseases and how to improve soil health.

Participants were from academic institutions in USA, France, Spain and South Africa, South African Government Departments, various ARC institutes. The commercial enterprises SAB Hop Farms, Illovo Sugar Ltd, Rooibos Ltd, Potato South Africa, Sakata Vegenetics, ZZ2 Tomato Producers, Starke Ayres, Woolworths, Citrus Research International, Invam Biocult Pty and ProCrop Trust.

The meeting was also attended by a Pretoria delegation from ARC-PPRI consisting of Drs Isabel Rong and Elna van der Linde and Johan Habig.

Contact: Dr Sandra Lampbrecht at LampbrechtS@arc.agric.za

Technology transfer

Refereed publications

ADAM R.A., **MITCHELL J.D**. & VAN DER WESTHUIZEN M.C., 2008. Aspects of foraging in the harvester termite, *Trinervitermes trinervoides* (Sjöstedt) (Termitidae: Nasutitermitinae). *African Entomology* 16: 153-161.

BASSET Y., MISSA O., MILLER S., CURLETTI G., DE MEYER M., **EARDLEY C.D**., MANSELL M., NOVOTNY V. & WAGNER T., 2008. Faunal turnover of arthropod assemblages along a wide gradient of disturbances in Gabon. *African Entomology* 16: 47-59.

BERNDT R., FRIERE F., PIATEK M. & **WOOD A.R**., 2008. New species of *Phakopsora (*Basidiomycota, Uredinales) from Cameroon, South Africa and Brazil. *Sydowia* 60: 15-24.

KHANJANI M. & **UECKERMANN E.A**., 2008. A new species of *Zetzellia* Oudemans (Acari: Stigmaeidae) from West Iran. *International Journal of Acarology* 34: 237-241.

MGOBOZI M.P., SOMERS M. & **DIPPENAAR-SCHOEMAN A.S**., 2008. Spider responses to alien plant invasion: the effect of short- and long-term *Chromolaena odorata* invasion and management. *Journal of Applied Ecology* 45: 1189-1197.

MITCHELL J.D., 2008. Swarming flights of the fungus-growing termite, *Macrotermes natalensis* (Haviland) (Isoptera: Macrotermitinae), and the environmental factors affecting their timing and duration. *African Entomology* 16: 143-152.

MOSTERT L., BESTER W., COERTZE S. & **WOOD A.R**., 2008. First Report of Daylily Rust Caused by *Puccinia hemerocallidis* in the Western Cape Province of South Africa. *Plant Disease* 92: 1133.

ROBERTSON M.P., KRITICOS D.J. & **ZACHARIADES C**., 2008. Climate matching techniques to narrow the search for biological control agents. *Biological Control* 46: 442-452.

SOLIS M.A., METZ M. & **ZACHARIADES C**., 2008. Identity and generic placement of *Phestinia costella* Hampson (Lepidoptera: Pyralidae: Phycitinae) reared on the invasive plant *Chromolaena odora*ta (L.) R.M. King & H. Rob. (Asteraceae). *Proceedings of the Entomological Society of Washington* 110: 292-301.

UECKERMANN E.A., 2008. A new species of *Pilonychiopus* Meyer, 1969 and *Farajimaeus* n.gen (Acari: Stigmaeidae) from South Africa.. *International Journal of Acarology* 34(3): 251-258

WHITEHEAD V.B., STEINER K.E. & EARDLEY C.D., 2008. Oil Collecting Bees Mostly of the Summer Rainfall Area of Southern Africa (Hymenoptera: Melittidae: *Rediviva*). *Journal of the Kansas Entomological Society* 81: 122-141.

Non-Refereed publications

DIPPENAAR-SCHOEMAN A.S., 2008. Spiders: the farmers and gardener's best friend. *Pest News* (Winter) 6.

DIPPENAAR-SCHOEMAN A.S., 2008. Colour change in *Thomisus* spiders (Araneae: Thomisidae). *SANSA Newsletter* 6: 12.

STALS, R. 2008. Invasive ladybird spreading in South Africa. *Biocontrol News and Information* **29**(2): 24N–26N (June 2008).

Publications of the ARC-PPRI 1992-2007

In September 2008 a booklet containing a list of 2023 publications (excluding non-refereed papers) was released. These publications were produced by the staff of ARC-PPRI for the period 1992-2007. The publications listed include:

- Refereed publications [740]
- Books [30]
- Chapters in books [133]
- CD-ROMS [7]
- Technical pamphlets [45 & 70 electronic fact sheets]
- Thesis [43]

The document is available from the Public Relations Officer at ARC-PPRI or a PDF-document can be downloaded from the ARC-PPRI website's homepage.

Contact: Petro Marais at maraisp@arc.agric.za

Newsletter

DIPPENAAR-SCHOEMAN A.S. & HADDAD C., 2008. SANSA Newsletter no 6: 1-13. July 2008.

Radio

DIPPENAAR-SCHOEMAN A.S., 2008. Radio interview: *Talk Radio 702* — Can spiders fly?

DIPPENAAR-SCHOEMAN A.S., 2008. Radio interview: *Radio Namakwaland* — Spinnekoppe en hul rol in die natuur.

STALS R. 2008. Radio interview: *Talk Radio 702* — The possibility to use fireflies as alternative domestic illumination.

STALS R. 2008. Radio interview: *Radio Pretoria* (programme 'Landboukorrels') — Recent developments concerning the invasive lady beetle in South Africa.

Congresses

5th International Congress of Nematology organized by the International Federation of Nematological Societies in Australia

SWART A. & KNOETZE R., 2008. [PAPER] A new *Globodera* cyst nematode from South Africa.

SUBBOTIN S.A., ADAMS B., BERT W., CASTILLO P., CHIZHOV V.N., INSERRA R.N., POWERS T., STURHAN D., **VAN DEN BERG E.**, VOVLAS N., YE W., YEATES G. & BALDWIN J.G., 2008. [PAPER] Molecular systematics of the Order Tylenchida: From Ribosomal RNA genes to genome analysis.

TIEDT L.R., **SWART A. & MARAIS M**., 2008. [POSTER] The presence of plant parasitic nematodes in peanut pods.

Technology transfer (continued)

23rd International Congress of Entomology, South Africa

ALLSOPP M. 2008. [PAPER]. The *Varroa destructor* invasion in South Africa: doing nothing can be the best response.

BOWNES A., HILL M. & BYRNE M., 2008. [PAPER] Potential efficacy of a candidate agent, *Cornops aquaticum* Brüner (Orthoptera: Acrididae) for biological control of water hyacinth, *Eichhornia crassipes* Mart. Solms-Laubach (Pontederiaceae) as influenced by water nitrate and phosphate levels.

BOWNES A., HILL M.P. & BYRNE M.J., 2008. [POSTER] Effect of temperature on feeding and development rates of a potential biocontrol agent *Cornops aquaticum* for water hyacinth in South Africa.

DUBE N., ASSEFA Y., OLCKERS T. & ZACHARIADES C., 2008. [POSTER] Fitness and fertility of interpopulation matings in *Pareuchaetes insulata* (Lepidoptera: Arctiidae), a biocontrol agent of *Chromolaena odorata* (Asteraceae) in South Africa.

EARDLEY C., ROGO L., RUGGIERO M., SCHINDEL D, MILLER S., PACKER L. & HERREN B., 2008. [PAPER] Collaborating in pollination science.

GROBBELAAR E., 2008. [PAPER] First biological and larval records for Afrotropical Donaciinae confirming the tribal placement of *Donaciasta goeckei* Monrós (Coleoptera: Chrysomelidae: Donaciinae).

KLEIN H., NESER S., NESER O. & HOFFMANN J., 2008. [PAPER] Unraveling a chalcidoid wasp complex associated with galls in the seed capsules of *Eucalyptus camaldulensis* in South Africa.

MAWELA K.V., KRÜGER K. & KFIR A.R., 2008. [POSTER] Biology of *Trichogrammatoidea lutea* (Hymenoptera: Trichogrammatidae), a potential biological control agent for *Helicoverpa armigera* (Lepidoptera: Noctuidae).

MAWELA K.V., KRÜGER K. & KFIR R., 2008. [PAPER] Biology of the egg parasitoid *Trichogrammatoidea lutea* (Hymenoptera: Trichogrammatidae) on three lepidopteran hosts species.

McCONNACHIE A., 2008. [PAPER] Keynote address: Biological control of emerging weeds in South Africa: an effective strategy to counter invasive alien plants at an early stage.

MILLAR I.M., GULLAN P.J. & HODGSON C.J., 2008. [POSTER] Morphological studies of *Cissococcus fulleri* (Hemiptera: Coccidae), a unique gall-inducing soft scale insect in South Africa, and evidence of a closely-related new species.

MULLER B., LOUW S & PRINSLOO G., 2008. [POSTER] Morphological identification of Chalcidoidea wasps occurring on *Erythrina caffra* and *E. lysistemon* and the impact of nutrient availability and concentration on survival rates.

NESER O., 2008. [POSTER] Chalcidoid wasps associated with galls on southern African plants: records from a specimen-based database.

NESER S. 2008. [PAPER]. A largely unstudied wealth of galls, gall-inducers and associated insects on indigenous South African plants.

NOFEMELA R.S., MOSIANE M.S. & KFIR R., 2008. [PAPER] The pest status of diamondback moth (Lepidoptera: Plutellidae) in South Africa: the role of parasitoids in suppressing the pest populations.

NOFEMELA R.S. & KFIR A.R., 2008. [POSTER] The influence of host size and active defensive reactions of diamondback moth instars on host selection by *Cotesia plutellae* (Kurdjumov) (Hymenoptera: Braconidae).

PRICE R., KIESER E.M. & BROWN H.D. 2008. [PAPER] Brown locust outbreaks in the South African Karoo - are locust control operations contributing to the problem?

ROBINSON M., ZACHARIADES C., ROBINSON D. & COHEN J., 2008. [PAPER] Field host range of *Melanagromyza eupatoriella* in Jamaica: implications for biological control of *Chromolaena odorata*.

SIMELANE D.O., 2008.[PAPER]. Edaphic factors influencing the performance of a root-feeding flea beetle, *Longitarsus bethae* (Coleoptera: Chrysomelidae), a biological control agent for *Lantana camara* (Verbenaceae).

STALS R., 2008. [PAPER] Arrival and rapid spread of *Harmonia axyridis* (Coleoptera: Coccinellidae) in South Africa.

STRATHIE L.W. & ZACHARIADES C., 2008. [POSTER] Phytophagous insects associated with *Chromolaena odorata* in continental and island habitats within its native range.

URBAN A.J., 2008. [PAPER] Trichromatic colour vision and alightment of a psyllid.

ZACHARIADES C., 2008. [PAPER] Biological control of *Chromolaena odorata* in Africa: some progress made but much more is needed.

Other meetings and talks

DIPPENAAR-SCHOEMAN A.S., 2008. Spiders the farmers' best friends. Invited talk at Pess Biz meeting of the Pest Control Association.

EARDLEY C.D., 2008. Status of African Bee Research Infrastructure. World Bee Summit.

STALS R., 2008. The unpleasant prospect of biotic homogenisation. Lecture to the public: Kempton Park Branch of Wildlife and Environment Society of South Africa.

SWART A., MARAIS M., VAN DEN BERG E., TEICHERT F. & VAN DER WALT Z., 2008. [POSTER] Plant parasitic nematodes, historical farm lands and archeological sites. 33 rd bi-annual Conference of the Zoological Society of Southern Africa.

VAN DEN BERG A., 2008. The wonder world of spiders. Lecture to Irene Preprimary School.

Other News

Targets for ecosystem repair after alien plant clearing in riparian zones

A special issue on riparian vegetation management and ecosystem repair in alien plant-invaded South African landscapes has been published in the latest issue of South African Journal of Botany. Volume 74 (2008) is a culmination of work (plus some additional papers contributing to the theme) from a project commissioned by Working for Water (WfW) on targets for ecosystem repair in alien-invaded riparian zones. The ultimate aim of this project was to produce guidelines and tools to improve management of these systems.

Since 1995, WfW, with its combined aims of enhancing ecological integrity, water security and social development, has been functioning under the assumption that its target ecosystems, mostly riparian, would "self-repair" once the main stressor (dense stands of invasive alien trees) had been removed. This assumption has been largely untested until now. The special issue contains 15 papers focussing on a range of issues from the setting of priorities at different scales; refining methods for effective removal of the invasive species and subsequent treatments to steer recovery in desired directions; to the problem of identifying reference sites. Target riparian systems include those found in the Fynbos, Grassland and Savanna biomes.

South African Journal of Botany is published by Elsevier, and is available online at www.sciencedirect.com. Contact Prof Karen J. Esler, Centre for Invasion Biology and Department of Conservation Ecology & Entomology, Stellenbosch University, kje@sun.ac.za should you need further information about the special issue.

Harlequin Mania (continued)

A few photographs submitted by the citizen scientists collaborating to monitor the spread of the harlequin lady beetle in southern Africa

Silvermine NR

Cradock

Wynberg

Alberts Falls

Congress anouncements

35th Annual Conference of the South African Association of Botanists (SAAB)
and
International workshop on
"Phosphate as a limiting resource"

Stellenbosch University
19– 22 January 2009

Organising Committee
saab@sun.ac.za
Postal address: Department of Botany and Zoology
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Matieland
7602
South Africa

http://www.sun.ac.za/botzoo/saab2009

Southern African Society of Systematic Biology 10th Anniversary Conference

is to be held 25 - 27 July 2009
at Natalia Resort, Illovo Beach, KwaZulu-Natal South Coast

The theme "Celebrating Darwin"

The format will be slightly different this year, with no parallell sessions. Presentations in the main programme will take the form of 7 minute 'speed talks' highlighting the essence of the work, and/or posters. To complement the shorter talks, the abstracts will be extended, and allow for presentation of methodology.

The SASSB conference will be held back-to-back with the 50th Anniversary conference of the Zoological Society of Southern Africa. There will be one day of overlap of the two conferences (25 July), where the theme will be "Darwin Day". The conference dinners and awards ceremonies for the two societies will be held separately. SASSB delegates are encouraged to attend both conferences.

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The online registration system is now available at www.sassb.co.za. We welcome both new registrations and long-term members.