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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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Biological control of hydrilla in South Afirica—where to from here?

In 2006, a new exotic aquatic macrophyte, hydrilla, *Hydrilla verticillata* (Hydrocharitaceae) (Fig. 1), was discovered in one of South Africa's major tourism dams, Pongolapoort (Jozini), in northern KwaZulu-Natal. At the time of its discovery by ARC-PPRI weeds scientist Lesley Henderson (see *Plant Protection News* No. 67, 2006), the infestation covered hundreds of hectares of the surface area (Fig. 2) where the Pongola River flows into the main body of the dam.

Hydrilla is native to south-east Asia and Australia, but has become a major aquatic weed in North and central America, especially in the south-eastern USA, and has been subjected to biological control as a management method in the USA since the late 1980s. This knowledge prompted the initiation of a biological control research project against hydrilla in South Africa with the investigation of an Indian/Pakistani leaf-mining fly, *Hydrellia pakistanae* (Diptera: Ephydridae), and an Australian stem-mining weevil, *Bagous hydrillae*, in 2007. In 2008, another ephydrid fly, *Hydrellia* sp. (Fig. 3), was investigated. It was collected from Singapore, which is close to where the South African biotype of hydrilla originates (Malaysia and Indonesia).

Hydrellia pakistanae is the most widely established and damaging agent in North America. However, it was decided to reject it as a candidate biocontrol agent based on poor laboratory performance and possible lack of geographical matching with the South African biotype of hydrilla. The stem-mining weevil, *B. hydrillae,* will be shelved temporarily, because its laboratory host range includes at least one plant species that occurs naturally in South Africa, *Vallisneria spiralis*. Although the field host range of *B. hydrillae* in the USA is almost entirely restricted to hydrilla, it was decided not to carry out the required lengthy benefit/risk assessment for South Africa at this time. If hydrilla were to expand its range to become more invasive in future, the investigation might be resumed at that time.

Figure 1. Hydrilla, *Hydrilla verticillata* (Hydrocharitaceae)

Detailed host range and host suitability trials indicated that the second fly species, *Hydrellia* sp., has a strong preference for its host plant, and limited potential to survive and establish permanent populations on native Hydrocharitaceae. This species, therefore, poses no risk to native biodiversity and is considered to be safe for release in South Africa. A release application for *Hydrellia* sp. has consequently been submitted for review by the Department of Agriculture, Fisheries and Forestry (DAFF) and local and international biocontrol experts.

The status of hydrilla will be reassessed in order to guide a decision on the release of the agent. The weed seems not to have dispersed as expected and, to date, the infestation at Pongolapoort Dam remains the only known infestation in the country. It is therefore currently not regarded as a priority aquatic weed.

Figure 2. Dense surface mats of *Hydrilla verticillata* at Pongolapoort Dam

Figure 3. *Hydrellia* sp. (Diptera: Ephydridae)

Biological control of hydrilla (continued)

Acknowledgements
Matt Purcell (CSIRO, Australia) and Michael Grodowitz (U.S. Army Corps of Engineers) are thanked for providing starter cultures of the candidate agents.

Suggested further reading:

- Balciunas, J.K., Burrows, D.W. & Purcell, M.F. (1996). Comparison of the physiological and realized host-ranges of a biological control agent from Australia for the control of the aquatic weed, *Hydrilla verticillata*. *Biological Control* **7**: 148-158.
- Balciunas, J.K., Grodowitz, M.J., Cofrancesco, A.F. & Shearer, J.F. (2002). Hydrilla. In: Van Driesch, R., Blossey, B., Hoddle, M., Lyon, S. & Reardon, R. (Eds) *Biological Control of Invasive Plants in the Eastern United States*. USDA Forest Service, Morgantown, WV, U.S.A. pp. 91-114.
- Madeira, P.T., Coetzee, J.A., Center, T.D., White, E.E. & Tipping, P.W. (2007). The origin of *Hydrilla verticillata* recently discovered at a South African dam. *Aquatic Botany* **87**: 176-180.

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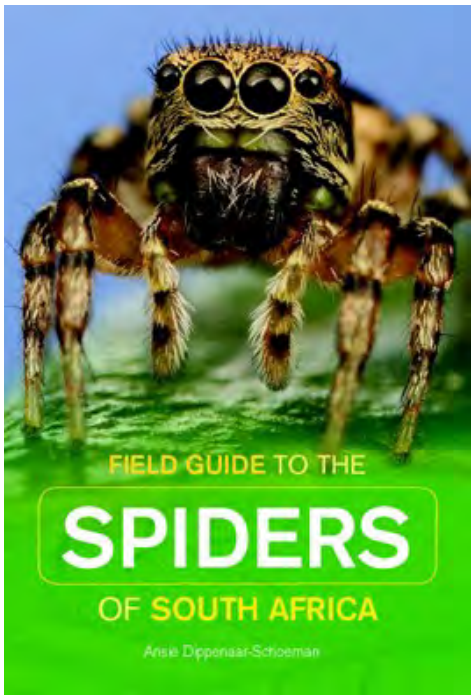
Biosystematics

NEW FIELD GUIDE ON THE SPIDERS OF SOUTH AFRICA



AUTHORS: Ansie Dippenaar-Schoeman
ISBN: ISBN 978-0-7993-6018-9 (printed book)
FORMAT: full colour
PUBLICATION DATE: January 2014
LANGUAGE: English
PUBLISHER: LAPA PUBLISHERS

Spiders are an abundant, diverse, and highly successful group of animals. They are common and abundant wildlife on every farm and in every garden and frequently also in houses. They are important predators in all terrestrial ecosystems, and can be regarded as the “best friends” of gardeners and farmers in sustainable agriculture. As predators, they are important in regulating the numbers of potentially harmful insects and mites. However, because of the venom they produce, they are feared and much maligned.

This field guide provides new information on a vast spectrum of spider species based on their morphology, behaviour and distribution. It is the first book to introduce all 70 South African spider families including 370 major genera and more than 860 of the more common species. All the families, genera and species are illustrated, and the book contains more than 2000 colour photographs and 860 maps. A thorough summary on their morphology, biology and habitat requirements are provided and the species of medical importance are discussed. The morphological characters of all the spider families known from South Africa are provided and illustrated with notes on their behaviour and further reading matter. For 370 major genera and 860 species short morphological data are provided with notes on their behaviour and distribution.

The purpose of this field guide is to enable the observer to identify spiders in the field. One of the difficulties facing the spider-watcher is that a large number of the species are small, are extremely well camouflaged and, therefore, not easily seen. For some genera you need a magnifying glass or microscope to be able to identify the specimen to generic or species level. Many species can only be identified by a specialist who has access to a good microscope and the relevant literature. Most of the spiders illustrated were photographed alive in their natural settings, and only some rare and smaller species were photographed using a camera mounted on a microscope. The illustrations and descriptions make it easy for the laymen to identify many of the common species encountered in and around the house.

In the book the spiders are divided in the free-living species and those that build intricate webs to catch their prey. The free- living spiders are further divided into those found on vegetation and those that live on the ground. The field guide will be valuable for members of the general public, researchers, conservation agencies, students, gardeners, farmers, as well as spider-watchers and photographers. It is available from all the larger booksellers.

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AUSTRALIAN INSECT TAXONOMIST VISITS THE NATIONAL COLLECTION

Dr Anthony Postle, an Australian insect taxonomist who specialises in Anthocoridae (Heteroptera: Cimicoidea), visited Pretoria in March and examined the anthocorids in the insect collection of the Biosystematics Programme at Roodeplaat. Anthocorids are a family of small blackish insects, commonly known as "minute pirate bugs". These insects are beneficial to agriculture, as various species prey on insect pests. The South African anthocorid fauna has not been reviewed since the early 1950s, so it came as no real surprise when Dr Postle identified amongst the material at least four genera not previously recorded from the country. In addition, there are specimens of what may be two undescribed genera. Dr Postle intends to continue his studies of specimens from the collection, during the coming year.

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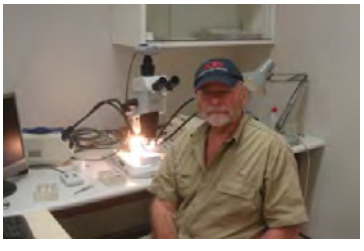

Dr Anthony Postle at the National Collection of Insects.

Biosystematics (continued)

AMERICAN SCALE INSECT TAXONOMIST VISITS THE NATIONAL COLLECTION

Dr Douglass Miller, a world authority on the taxonomy of scale insects and mealybugs (Hemiptera: Coccoidea), spent a week at the National Collection of Insects during March. Doug worked for many years at the Systematic Entomology Laboratory of the United States Department of Agriculture (USDA), before retiring in 2006. However, he has continued his research on scale insect taxonomy. Many species of scale insects and mealybugs are important pests of crops and ornamental plants.

Doug spent his time in Pretoria studying the specimens of the mealybug genus, *Octococcus,* that are deposited in the scale insect collection at PPRI, for his taxonomic revision of this genus. Most species of *Octococcus* occur only in South Africa; one species is found in Egypt. They often feed on plants belonging to the daisy family, Asteraceae. At least one of the samples in the National Collection belongs to a new species.

During his years at the USDA, amongst many other projects Doug authored or co-authored a number of modern catalogues of the scale insect families. These catalogues are indispensable works that cover all the world species, their distributions, food plants and relevant scientific literature. Doug was accompanied by his partner Barbara Denno during his visit to South Africa. Barbara is currently updating the electronic version of the scale insect catalogues, which is a searchable database on the internet site "ScaleNet".

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Doug Miller and Barabara Denno at the National Collection of Insects

VISIT TO ISRAEL

Within the framework of the new Israel Taxonomic Initiative, taxonomy courses are conducted in Israel where world experts are invited to share their expertise with national and international participants. Prof Ueckermann was invited for a second time to present a course on eleven soil mite families of agricultural importance at the Hebrew University at Rehovot, from 27 January to 13 February 2014. The first two weeks were spent with colleagues at the Department of Entomology, Newe-Ya'ar Research Center, to refine the course manual and to collect soil mites. The interest in these eleven soil mite families is part of a project that involves searching for potential biological control agents of pests, or overwintering stages of pests, in soils. This course was attended by 20 participants, two of whom were from Spain, and two others were from the biological control company Koppert in The Netherlands.

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Prof Ueckermann with course participants.

Rudy Jocqué, arachnologist from the Royal Museum of Central Africa, looking for spiders (Photograph by P. Webb).

The magnificent view from within the Aardvark Nature Reserve Biodiversity Conservation Area (Photograph by P. Webb).

Spider collecting at Aardvark Nature Reserve Biodiversity Conservation Area

At the invitation of Kobus Lubbe of the Nature College, the Arachnid Unit sampled spiders at the Aardvark Nature Reserve Biodiversity Conversation Area near Riversdale, Western Cape Province. The Nature College is situated on the reserve and trains students in various fields such as guiding and tracking. The trip took place from the 24th to the 30th of January 2014. The team, comprising Robin Lyle, Petro Marais and Peter Webb, set out on the long journey through the heart of the Karoo. They were joined by Rudy Jocqué and his wife Elizabeth Tybaert, who were making the most of their time in South Africa. Rudy is a renowned spider taxonomist working on the Afrotropical spider family Zodariidae at the Royal Museum of Central Africa in Tervuren, Belgium. Accommodation was provided in an old army-built house, situated on the top of the mountain in 3400 hectares of pristine Little Karoo. Recent unseasonal rains and floods made the area lush. It is a truly wonderful area to collect in, surrounded by the Cape Fold Mountains.

The opportunity to sample this area is an important part of the South African National Survey of Arachnida (SANSA) project. The reserve is situated in the Succulent Karoo Biome, a biome that is poorly sampled. The reserve area is proclaimed as a Biodiversity Agreement Conservation Area by Cape Nature. The standard SANSA protocol was adopted, where various methods are used to sample as many microhabitats as possible. Sorting of the material that was collected in the reserve is currently underway at the Arachnid Unit, and a species list will be produced soon.

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Biosystematics (continued)

11th Colloquium of the African Arachnology

The colloquium was hosted by the University of the Free State and National Museum in Bloemfontein, and was held at the Amanzi Private Game Reserve (APGR) in the Brandfort district, Free State, South Africa. The objectives of the Colloquium include promoting research on the African Arachnida (non-Acari) and to provide a forum for the discussion of this research in oral presentations, posters and workshops, as well as informal discussions.

Some highlights:

- 28 people attended, including visitors from Russia and Belgium;
- 31 papers and 6 posters were presented;
- the second red data listing workshop was held, and was organised by Theresa Sethusa and Domitilla Raimundo of the South African National Biodiversity Institute (SANBI);
- launch of the new book on the spiders of the Grassland Biome;
- other workshop discussions: the way forward for SANSA; barcoding and the collecting of DNA samples; and the way forward in compiling a common name list for spiders;
- awards: Ansie Dippenaar-Schoeman received the award for the best contribution to African Arachnology over the last three years (2011-2013), for the second time; and, together with Dr Stefan Foord, also received the award for the best paper overall.

The Biosystematics Programme participated in the following:

DIPPENAAR-SCHOEMAN, A.S. 2014. How the digital camera has opened a new word to arachnid research (Paper).

DIPPENAAR-SCHOEMAN, A.S., LYLE, R., HADDAD, C.R. FOORD, S. H. & LOTZ, L. 2014. The South African National Survey of Arachnida (SANSA) – past and present (Paper).

DIPPENAAR-SCHOEMAN, A.S. & HADDAD, C. R. 2014. New book on the spiders of the Grassland Biome (Poster).

FAIOLA, J., **DIPPENAAR-SCHOEMAN, A.S. & LYLE, R**. 2014. Survey of the arachnids of the Klipriviersberg Nature Reserve, Johannesburg (Paper).

FOORD, S.H. & **DIPPENAAR-SCHOEMAN, A.S**. 2014. Space -time interactions and variability in spider diversity along an elevational transect in a Floristic Kingdom sensitive to climate change (Paper).

KELLY, J**., MATHEBULA, S. & DIPPENAAR-SCHOEMAN, A.S**. 2014. Species for Africa – a rich biodiversity of insects and spiders collected from one trap in an urban area in Pretoria. (Poster).

LYLE, R. & DIPPENAAR-SCHOEMAN, A. 2014. A taxonomic revision of Afrotropical genera of the trapdoor spider sub -family Idiopinae (Araneae: Idiopidae) (Poster).

LYLE, R. & DIPPENAAR-SCHOEMAN, A. 2014 Initial steps towards a phylogenetic study of the Afrotropical Idiopidae (Araneae: Mygalomorphae) (Paper).

MARAIS, P., DIPPENAAR-SCHOEMAN, A.S., ANDERSON, C. MATHEBULA, S. & LYLE, R. 2014. The National Collection of Arachnida: present status (Poster).

MARAIS, P., DIPPENAAR-SCHOEMAN, A.S., ANDERSON, C. MATHEBULA, S. & LYLE, R. 2014. The spider type specimens deposited in the National Collection of Arachnida (Poster).

MODIBA, M.A., KHOZA, T.T., **DIPPENAAR-SCHOEMAN, A.S**. & DIPPENAAR, S.M. 2014. Diversity of spiders (Araneae) of the Polokwane Nature Reserve, Limpopo province, South Africa (Paper).

WIESE, L. & **DIPPENAAR-SCHOEMAN, A.S**. 2014. Spider diversity of the Addo Elephant National Park (Paper).

WEBB, P. & **DIPPENAAR-SCHOEMAN, A.S.** 2014. A photographic survey of the arachnids of Irene (Paper).

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LAUNCH OF A NEW BOOK ON GRASSLAND SPIDERS

During the colloquium, the new Grassland spider book by Ansie Dippenaar-Schoeman and Charles Haddad was launched by Rudy Jocqué. This new book is the first to provide information on the 58 families, 275 genera and 792 species of spiders found in the Grassland Biome of South Africa. Of these, 58 species are endemic to the biome. The purpose of this book is primarily to provide baseline information on diversity in an area that has previously been poorly sampled. Descriptive characters for the families, genera and species are provided, with information on their guilds and behaviour. The book is richly illustrated with >600 colour photographs. The focus in this book is on the families and genera that are likely to be encountered, as many spider species are small and often not easily seen. The five chapters deal with the free-living plant dwellers, plant web dwellers, free-living ground dwellers, ground burrow dwellers and ground web dwellers.

This book is a product of the South African National Survey of Arachnida (SANSA). The main aims of SANSA are to produce inventories of the arachno-fauna of South Africa, and to assemble much needed information on their distribution and abundance. The book is a joint effort of the Agricultural Research Council and University of the Free State, and was funded by E. Oppenheimer & Son.

The book costs R160.00 and is directly available from ARC-Plant Protection Research Institute.

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Book can be ordered from Sma Mathebula at MathebulaS@arc.agric.za

Ansie Dippenaar-Schoeman, Rudy Jocqué and Charles Haddad

Biosystematics (continued)

Spider diversity along an elevational transect in a floristic kingdom sensitive to climate change*

*This talk received the best paper award at the 11th Africa Arachnological Colloquium

Space-time interactions and variability in spider diversity along an elevational transect in a floristic kingdom sensitive to climate change were investigated. Space, time and the impact of their interaction on diversity is central to our ability to understand and predict future change in diversity. Mountains provide ideal testing grounds for this understanding and possible spatial surrogates for temporal responses of assemblages to climate change. Most studies of spider assemblages are spatial snap shots and none exists for an elevational transect over multiple years. For the first time we described the monitoring of epigeal spider assemblages, twice a year over a six year period in 17 elevational sites (0 - 1900 m), on both sides of the Cederberg mountains in the Western Cape, South Africa. We test whether there is a change in richness, turnover over time, identify the relative contribution of spatial, seasonal and annual turnover to gamma diversity, identify possible processes responsible for this turnover and use species time and area relationships (STAR) to identify at what scale temporal and spatial processes are equivalent and whether the space-time interaction is negative.

New *Ammoxenus* sp. sampled in the Cederberg Mountains

Spiders were caught with pitfall traps twice a year (during dry and wet seasons) along an east-west elevational transect in the Cederberg mountains, South Africa. A total of 10866 specimens, 192 species, 117 genera, 42 families were sampled, and all the material is housed in the National Collection of Arachnida at the ARC. There was no significant change in alpha diversity over space and time; beta diversity also remained constant. Seasonal turnover contributed most to turnover at a site. Space-time interaction had a negative impact on richness. Not only was data used to test for long-term monitoring, but at least ten species sampled are new to science.

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Barcoding the specimen holdings of the PPRI collection, National Collections of Fungi: Value added initiative

The National Collections of Fungi (NCF) encompass two collections, namely the herbarium and the living culture collections. The international acronym PREM denotes the South African National Collections of Fungi herbarium collection, which houses approximately 60 000 specimens. The specimens represent material that has been collected from all continents, with the focus on agricultural research, since 1905. The PPRI collection houses 13 000 specimens and encompasses the reserved and publically available living fungal cultures. Each specimen in the collections is assigned a unique PREM or PPRI number, respectively. The collection data of each specimen includes Darwin core information using the Access to Biological Collections Data [ABCD] schema. Darwin Core was initially a set of terms first introduced in 1999 to ensure utility for data integration. These developed into a data standard for biodiversity data internationally.

DNA barcoding is a novel method for investigating the immense diversity of living species by utilising an organism's unique arrangement of the genetic code at a small, standard region of its entire genome. This particular DNA sequence works just like a fingerprint. DNA barcoding is designed to provide rapid, accurate, and automatable species identifications by using short, standardised gene regions as internal species tags. It can be used to identify species, and also to determine their phylogenetic relatedness.

The internal transcribed spacer (ITS) is the preferred DNA barcoding marker for fungi because of the higher number of flexible sites between inter- and intraspecific variation. The ITS region has the highest probability of facilitating successful identification for the broadest range of fungi, with the most clearly defined barcode gap between inter- and intraspecific variation. Owing to these advantages gained in using ITS, which outweigh its limitations, the international mycological community decided to adopt ITS as a universal marker for Fungi.

The fungal barcoding initiative (Fig. 1) at the National Collections of Fungi was established as part of our commitment to the National Research Strategy for Fungi, to ensure effective services to the scientific community and to add value to the collections. Currently, ITS and translation elongation factor 1 α barcodes are being generated for selected isolates from the PPRI collection, depending on the species.

Approximately 3.8% of the PPRI collection has been barcoded to date, excluding those cultures included in current research projects. Preference was given to the most frequently requested species by clients and researchers. This not only cuts down on the time researchers spend to morphologically verify the identity of cultures before dispatch to clients, but also ensures that these cultures are available for incorporation into current research projects, as their identities have been confirmed.

Although the Mycology collection team has a lengthy road ahead, they are well inspired and motivated to take up the challenge. The collection team consists of research assistants, data capturers, technicians and researchers focussing on different aspects of the task to achieve the same goal. Each person knows their role relative to the team, and also appreciates the importance of team work.

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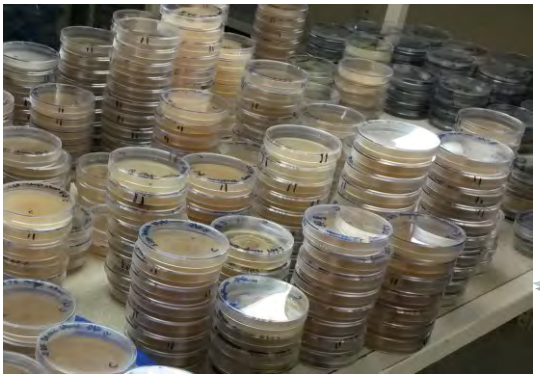
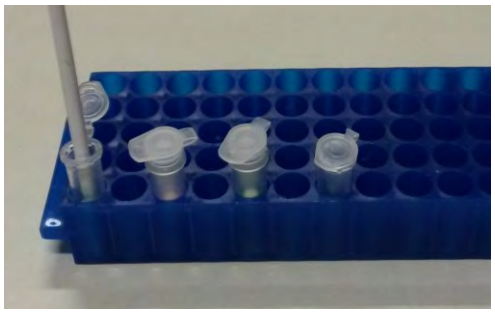
Biosystematics (continued)

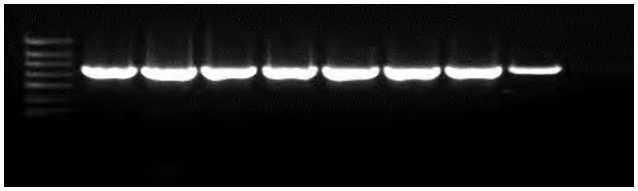
Barcoding the specimen holdings of the PPRI collection (continued)



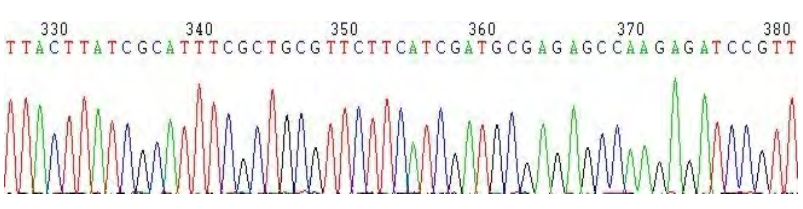
Cultivation of fungal isolates from a single spore or hyphal tip



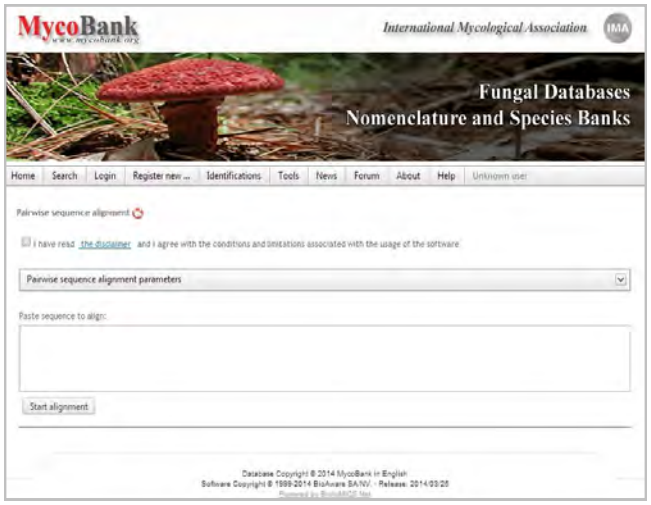
DNA extraction from mycelium



PCR amplification of selected gene region using international accepted primer sets



Sanger sequence data are generated and edited



BLAST analysis, comparing the sequence of the unknown isolate to those of voucher isolates in Mycobank database

Identification based on BLAST results. Data are captured in the PPRI collection and BioBank databases of ARC-PPRI

Figure 1. A flow diagram representing the barcoding process from culture to data analysis.

Biosystematics (continued)

Beware of wild mushrooms

During February and early March various wild mushrooms have been visible on lawns and grassy areas in and around Pretoria. One should be very cautious when collecting wild mushrooms for eating as certain species are poisonous. One of the common poisonous mushrooms found during this time was the false parasol, *Chlorophyllum molybdites* (Fig. 1). This mushroom causes severe intestinal pain, nausea and diarrhoea when eaten, and the symptoms may last for about three days.

The false parasol is widely distributed and common in Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga and North-West Provinces. From the 44 specimens of *C. molybdites* in the dried PREM collection of the National Collections of Fungi, 31 were collected from Gauteng. Fruit bodes occur mostly in small groups (Fig. 1), or sometimes form fairy rings in lawns and grassy places (Fig. 2) in summer and autumn after good rains.

The structure of the fruiting / mushroom body (Fig. 3) and the spores are very characteristic of a particular species and are used for identification. The fruiting body of the false parasol can be recognised by the large, irregular, amber brown scales over the white to creamy surface of the cap, the dark brown centre of the cap, green lamellae (gills) and a large prominent ring on a brownish stipe. The greenish tints which progressively darken on the maturing lamellae (Fig. 4) and the stipe which turns reddish brown after cutting (Fig. 5) are the most striking characteristics of this species.

The cap has a convex or umbonate shape (with central swelling like the boss at the centre of a shield), 100-250 mm in diameter and its margin is even or crisped on surface view. The stipe is about 250 x 25 mm, attached to the centre of the cap and somewhat cub-shaped due to the swollen base. The ring on the stipe is conspicuous, movable, and white with a brownish margin below. Lamellae attachment is free, crowded with full and intermediate lengths, white at first turning greenish to dull olive green with age and drying greenish-khaki. It has a greenish spore print (Fig. 6). Spores are hyaline to greenish in mass, ovoid to broadly ellipsoidal, smooth, thick-walled and 9-11 x 6.5-8 µm in size.

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Fig. 1. Fruiting bodies of the false parasol, *Chlorophyllum molybdites*, occurring in groups in lawns.

Fig. 2. Fruiting bodies of the false parasol occurring in a semi-circle formation, also referred to as a fairy ring.

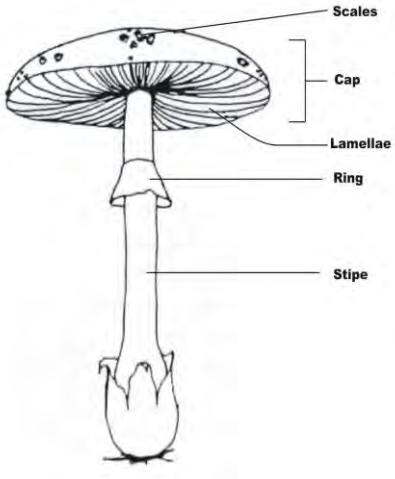

Fig. 3. Mushroom body structure.

Fig. 4. Lamellae of the false parasol showing characteristic greenish tint.

Fig. 5. Reddish brown discolouration of the stipe after cutting.

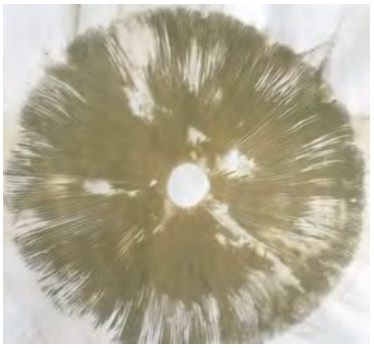

Fig. 6. Green to greenish-khaki spore print of the false parasol.

Plant Microbiology

Soil Microbiologist attends 1st Africa Congress on Conservation Agriculture

Johan Habig, from the Soil Microbiology Unit, attended the 1st Africa Congress on Conservation Agriculture (ACCA) from 18-21 March 2014 in Lusaka, Zambia. The congress was hosted by the African Conservation Tillage Network (ACT) in partnership with NEPAD, COMESA, NORAD, CIMMYT and FAO with the theme: *Conservation Agriculture: Building entrepreneurship and resilient farming systems.* The Congress brought together 414 delegates, including agricultural specialists, environmentalists, economists, farmers and farmer organisations, donors, participants from the private sector, training institutions, and government and non-governmental organisations involved in agriculture and rural development from all regions.

The congress provided a platform to share experiences and raise awareness on practical on-the-ground experiences and lessons on Conservation Agriculture (CA). Special attention was given to the impact of CA in relation to household, national and global efforts to achieve improved agricultural performance and environmental resilience. This would, in turn, positively impact food security, poverty alleviation, and environmental stability. Interactions among the diverse disciplines and interest groups were also facilitated in an attempt to enhance a holistic and integrated driving-force in promoting the expanded adoption of CA practices that will meet the increasing requirements of the growing population.

The congress focused on experiences and lessons learned from interventions and practices that were successful in triggering and/or enhancing sustained adoption and expansion of CA as a way to improve farming productivity, ecosystem resilience, and overall productivity of the land-water systems. The benefits of increased CA-adoption by farmers as a potential means of relieving the effects of climate change, was also discussed.

Johan presented his paper: "*Effects of Conservation Agriculture on soil microbial community dynamics*" in an oral plenary session under the sub-theme "*Increasing CA adoption - how innovative technology, approaches, infrastructure support and policies can drive greater adoption of conservation agricultural systems in Africa*".

Other sub-themes included:

1. Growing more with less – the future of sustainable intensification.
2. Weather proofing agriculture - the adaptation of farming practices to address climate variability and change.
3. CA for sustained wealth creation – unlocking barriers to entrepreneurship along the value chains.
4. Food sovereignty – integrated CA based systems and family farms.
5. Effective research, inclusive of socio-economic challenges, and targeting strategies for enhanced CA adoption.
6. Harnessing the power of collaboration – networking, partnerships and communities of practice.

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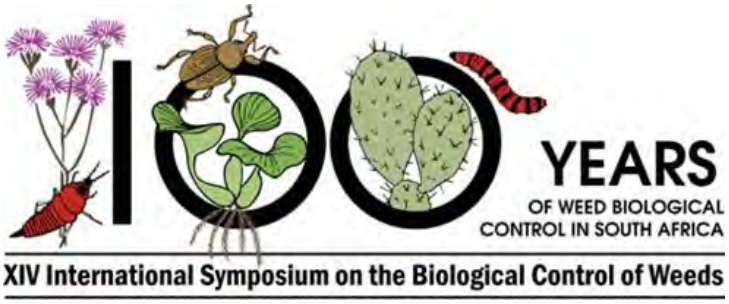
Delegates at Africa Congress on Conservation Agriculture.

Weeds Research

International Symposium hosted by South Africa



The South African weed biocontrol fraternity has had the honour of hosting the XIV International Symposium on the Biological Control of Weeds (ISBCW) from 2nd to 7th March 2014 in Kruger National Park. This memorable event, which had "100 Years of Weed Biological Control in South Africa" as its theme, was held at the recently-completed Nombolo Mdhuli Conference Centre in Skukuza, Kruger National Park. Approximately 150 delegates (Fig. 1), representing 23 countries, attended the symposium.

The organisers broke with tradition by not allowing the delegates to display their posters physically on poster boards as in the past. Instead, a summary of each poster was presented orally in 4-minute slots interspersed with the normal 15-minute oral presentations. These "speed talks" were welcomed by most delegates as an excellent way of transferring information in a rapid, concentrated form, while it was still possible to take home an A_4-sized copy of the posters.

The Organising Committee consisted of members from the University of Cape Town, Rhodes University, ARC-PPRI and SANParks, and was widely commended on the outstanding quality of this highly enjoyable scientific gathering.

Thanks to generous funding by the Department of Environmental Affairs, ARC-PPRI was represented by 19 delegates who presented a total of 4 oral and 18 poster presentations, listed below.

Oral presentations:

BOWNES, A. Suitability of the leaf-mining flies *Hydrellia pakistanae* and *Hydrellia* species (Ephydridae) for biological control of *Hydrilla verticillata* (Hydrocharitaceae) in South Africa.
McCONNACHIE, A. & STRATHIE, L. The dilemma with *Epiblema* (Lepidoptera: Tortricidae): challenges for its use as a biological control agent for the invasive plant *Parthenium hysterophorus* in Africa.
STRATHIE, L & McCONNACHIE, A. Biological control and the issues facing management of *Parthenium hysterophorus* in Africa.
ZACHARIADES, C., STRATHIE, L. & DUBE, N. A quarter-century of biological control research on *Chromolaena odorata* in South Africa.

Poster presentations:

ASCENCIO, C.M., DIEGO, Y.H., DEL VAL DE GORTARI, E. & **HEYSTEK, F.** Insect communities and herbivory on four native populations of crofton weed, *Ageratina adenophora* (Spreng.) R.M.King & H.Rob. (Asteraceae), in Mexico.
DELGADO, O, **STRATHIE, L. & ZACHARIADES, C**. The stem-galling weevil *Conotrachelus reticulatus* (Coleoptera: Curculionidae), a suitable agent for the biological control of *Chromolaena odorata.*
DEN BREEYEN, A. Developing an optimal augmentative release

Figure 1. Delegates at ISBCW.

Weeds Research (continued)

International Symposium hosted by South Africa (continued)

strategy for the rust-fungus *Puccinia eupatorii*, a biological control agent of pompom weed, *Campuloclinium macrocephalum* (Asteraceae), in South Africa.
DUBE, N. & ZACHARIADES, C. *Dichrorampha odorata* (Lepidoptera: Tortricidae) on *Chromolaena odorata* (Asteraceae): adult no-choice host-range tests yield the same results as no-choice tests using non-neonate larvae
GAREEB, M. & SAMBO, S. Optimising mass-rearing techniques for *Listronotus setosipennis* (Curculionidae) and *Zygogramma bicolorata* (Chrysomelidae), for the biological control of *Parthenium hysterophorus* in South Africa.
GITONGA, L., CRON, G.V, **McCONNACHIE, A.** & BYRNE, M. Genetic variation in the invasive pompom weed, *Campuloclinium macrocephalum* (Asteraceae), in South Africa.
HENDERSON, L. The Southern African Plant Invaders Atlas (SAPIA) and its contribution to biological weed control.
KLEIN, H. Biotypes of *Dactylopius tomentosus* (Hemiptera: Dactylopiidae) as biocontrol agents against various problematic *Cylindropuntia* species (Cactaceae) in South Africa.
KOTZé, L.J.D., **WOOD, A.R. & LENNOX, C.L.** Risk assessment of the *Acacia cyclops* dieback pathogen, *Pseudolagarobasidium acaciicola*, as a mycoherbicide in the South African strandveld and limestone-fynbos vegetation types **.**
MADIRE, L.G. & NETSHILUVHI, M. Biological control of *Tecoma stans* (L.) (Bignoniaceae) in South Africa.
MAWELA, K.V. & SIMELANE, D.O. Natural enemies of Mexican sunflower, *Tithonia diversifolia* (Asteraceae), in Mexico and their potential as biological control agents in South Africa.
MPEDI, P. & SIMELANE, D.O. In search of South African *Lantana camara* L. (Verbenaceae) varieties susceptible to the leaf-galling mite biotypes of *Aceria lantanae* (Acari: Eriophyidae).
MPHEPHU T.E. , SIMELANE, D.O. & OLCKERS, T. Suitability of the defoliating beetle *Physonota maculiventris* (Coleoptera: Chrysomelidae) for release against *Tithonia diversifolia* (Hemsl.) A.Gray (Asteraceae) in South Africa.
MUKWEVHO, L, SIMELANE, D.O. & OLKERS, T. An eriophyphid mite, *Aceria lantanae* (Cook) (Acari), nipping the invasive weed *Lantana camara* L. (Verbenaceae) in the flower bud.
RAMANAND, H., McCONNACHIE, A. & OLCKERS, T. Thermal physiology of *Liothrips tractabilis* Mound and Pereyra (Thysanoptera: Thripidae), a biological control agent of *Campuloclinium macrocephalum* (Less.) DC. (Asteraceae) in South Africa.
SIMELANE, D.O, MAWELA, K.V. & FERRUCCI, M.S. Release and initial establishment of a seed-feeding weevil, *Cissoanthonomus tuberculipennis*, a biological control agent for balloon vine, *Cardiospermum grandiflorum*, in South Africa
UYI, O.O., HILL, M.P. & **ZACHARIADES, C.** Disentangling the impacts of temperature on the performance of *Pareuchaetes insulata*, a biological control agent of *Chromolaena odorata* **.**
WOOD, A.R. The gall rust fungus *Prospodium transformans*, a potential agent for use against *Tecoma stans* (Bignoniaceae), fails to establish in South Africa.

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

Technology Transfer

Scientific publications

CANNING, G., REILLY, B.K. & **DIPPENAAR-SCHOEMAN, A.S.** 2014. The distribution and population status of *Nesiergus insulanus* (Araneae: Theraphosidae: Ischnocolinae) on Frégate Island, Seychelles. *Arachnology* 16: 124–129.
MUZHINJI, N., WOODHALL, J.W., **TRUTER, M**. & VAN DER WAALS, J.E. 2014a. Elephant hide and growth cracking on potato tubers caused by *Rhizoctonia solani* AG-3 PT in South Africa. *Plant Disease* 98(4): 570. http://dx.doi.org/10.1094/PDIS-08-13-0815-PDN.
MUZHINJI, N., WOODHALL, J.W., **TRUTER, M.** & VAN DER WAALS, J.E. 2014b. First report of *Rhizoctonia solani* AG 4 HG-III causing potato stem canker in South Africa. *Plant Disease "First Look" paper*, http://dx.doi.org/10.1094/PDIS-11-13-1131-PDN.
NEL, E., KELLY, J. & **DIPPENAAR-SCHOEMAN. A.S.** 2014. Notes on the biology of the wasp, *Chalybion spinolae (*Hymenoptera: Sphecidae), an obligatory predator of *Latrodectus* (Araneae: Theridiidae) spiders in South Africa. *Journal Natural History* DOI:10.1080/00222933.2013.877993
SWANEPOEL PA, **HABIG J,** DU PREEZ CC, BOTHA PR, SNYMAN HA. 2014. Biological quality of a podzolic soil after 19 years of irrigated minimum-till kikuyu-ryegrass pasture. *Soil Research* 52: 64-75.

Training of Trainers Programme at ARC

The Training of Trainers Programme at the ARC is meant for ARC researchers and technicians tasked with offering short courses and skills programmes. The programme is organised by ARC Training Unit, which sources training providers who offer certified courses in Facilitation Skills, Assessor Training, and Moderator Training. These courses were presented sequentially at ARC-Central Office in the last quarter of 2013, and were attended by researchers and technicians from different ARC Institutes. As part of the Training of Trainers Programme, the training material development course was presented at the ARC-CO from 20-24th January 2014. The four participants from the Plant Protection Research Institute (ARC-PPRI) enrolled for the course were Dr Draginja Pavlic-Zupanc (Biosystematics), Dr Ahmed Hassen (Plant Microbiology), Mr Satch Mosiane (Insect Ecology) and Ms Ayanda Nongogo (Weeds Research). This interactive course was a great opportunity for sharing knowledge and experience between researchers from different institutes while preparing assignments required for this certified course.

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Participants at the training material development course held at ARC-Central Office from 20-24th January 2014. From left to right: Satch Mosiane, Thembi Ngcobo, Ayanda Nongogo, Koketjo Lekoane, Dr Ahmed Hassen, Refilwe Khalo, Sonwabo Booi, Dr Rorisang Patose, Thebeyamotse Tshabang, Martha Chabe, Dr Draginja Pavlic-Zupanc, Prof Stephen Njiro, Mmathaha Mosala, Prof Lisa Boomker, Hans van Zyl, Erik Mathebula, Dr Mary-Jane Thaela Chimuka, Nancy Ntidi, Dominicus Yotwana, Malcolm Gulwa.