The FAO has recognised the ARC as a centre of excellence for training on Fall Army Worm (FAW, *Spodoptera frugiperda*), the Tomato Leaf Miner (*Tuta absoluta*) and Maize Lethal Necrosis Disease (MLND). These transboundary plant pests and disease threaten regional food security and trade within the SADC region. Two, week-long training courses co-hosted with the FAO were presented to National Plant Protection Organisation representatives from SADC countries. The focus of these workshops was information dissemination, and training on the identification and management strategies of FAW, *T. absoluta* and MLND. Delegates were...
trained in identification skills, and diagnostic methods and symptom recognition. Country representatives then provided input for the development of regional and national management strategies for these pests and MLND. The highlight of the training was the practical activities that supported lectures. These included ‘hands on’ identification, pesticide calibration and application techniques, as well as laboratory work to learn diagnostic methods for MLND.

These courses afforded ARC-PHP with an ideal opportunity to highlight the wide range of skills and expertise within the insect ecology, biosystematics and virology units at ARC-PHP. Specialists from VOP, Small Grains and the Bio-Tech Platform at OVR also made invaluable contributions to the training sessions.

Information on applicable research projects being undertaken within in the ARC was shared. These projects, funded through the Department of Agriculture, Land Reform and Rural Development (previously DAFF), include scouting for overwintering hotspots for FAW, surveying for MLND within South Africa and investigating the effect of FAW infestations on smallholder farmers.

The delegates enjoyed the training overall and found the acquired skills beneficial. The ARC, as a centre of excellence, will continue to provide support to SADC countries on FAW, *T. absoluta* and MLND.

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**VIRIDI®ELISA KITS - TIA matchmaking event winner**

The Innovation Bridge (IB) Technology Matchmaking and Showcasing Event was held on 4 December 2019 at the CSIR. The event was aimed at encouraging and accelerating the utilisation and commercialisation of new and existing knowledge and technologies, developed by publicly funded South African research and technology development institutions. Participant partners included the Small Enterprise Development Agency (SEDA), Founders Factory Africa and the patent attorney firm DM Kisch. The ARC contributed with three project pitches that included the Viridi®Elisa kits, Amaranth enriched bread and the utilisation of water hyacinths by-products such as methane gas, animal feed and soil ameliorants. The judges selected the Cape-Bio — ARC partnership for the Viridi® Elisa kits. The award was shared with another project on marog beer. The prize includes services from IP Kisch, support from SEDA and a cash reward, to be shared amongst the winning partners.

*Contact: Ronel Roberts at ViljoenR@arc.agric.za*
Great Zimbabwe (GZ), listed by UNESCO as a World Heritage Site in 1986 is undoubtedly sub-Saharan Africa’s largest and most imposing early dry-stone monument. This African Iron Age city, built between 1100 and 1450 AD, spans approximately 800 ha and is divided into three archaeological sites: the Hill Ruins, the Great Enclosure and the Valley Ruins. Structures at the site are predominantly constructed using dry-stone walling. The area is characterised by numerous attractive views of the ruins and is set in a scenic location.

*Lantana camara*, commonly referred to as lantana, an invasive weed native to Central and South America, is currently choking the heritage site and causing damage to the magnificent stone structures. This is of great concern to authorities of the National Museums and Monuments of Zimbabwe (NMMZ). Lantana plant roots penetrate the dry stonewalls, defacing and forcing them apart, allowing rain to enter, which could potentially lead to eventual collapse of the walls. It also poses a significant fire risk during the dry season.

Plant Health and Protection, Agricultural Research Council (ARC-PHP) was approached by the World Monuments Fund to develop an integrated control programme for lantana at this magnificent site. Drs David Simelane and Jeremy Goodall, two consultants from ARC-PHP were tasked with assessing the lantana infestations, recommending management options based on the unique physical characteristics of the site, training NMMZ staff in control methodologies and supervising a trial programme at the monument.

Assessments of the extent of infestation and the abundance of biocontrol agents in and around the monument site were conducted in early December 2019. This was followed by four days training of NMMZ staff and community members on the implementation of the integrated lantana control programme. Integrated control of lantana is underpinned by mechanical, chemical, biological and cultural control measures. Individually, these measures have failed, though integrated approaches combining all these approaches along with community participation and proper land management have been relatively successful. The training therefore involved the physical removal of lantana and follow-up treatments using herbicides. While studies aimed at identifying suitable biocontrol agents for the area are being conducted, NMMZ have been advised to follow mechanical and chemical control measures.

Drs Simelane and Goodall also supervised the trial control programme of lantana at the monument. The trial demonstrated that with sufficient human resources, lantana at the monument could be brought under control within a short period. However, the participation of the surrounding community will be key to the success of the control programme, as this will inhibit re-infestation of the monument. The confidence of the World Monument Fund in the Weeds Division’s ability to develop an integrated lantana control programme in GZ is indicative of its international standing, particularly in SADC countries.

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Emergence of Pythium as highly virulent pathogen

During the period of March to December 2019, the incidence and reporting of several Pythium species on numerous crops increased. To date, 15 diagnostic reports have been compiled reporting on the emergence of Pythium aphanidermatum as a highly virulent pathogen on numerous agricultural crops. The increase in virulence of this species is directly related to extreme temperatures and arid climatic conditions, optimal conditions for this species. In addition, since 2016, there has been an increase in the presence and pathogenicity of several Pythium species in hydroponic production systems, leading to a significant loss of revenue for growers. This increase in pathogenicity is also directly related to extreme high temperatures, arid conditions and polluted water.

Effective treatment for the eradication of zoospores in reservoirs and irrigation lines, represents a challenge at present because of increased resistance and genome related adaptation. In addition, with the onset of extreme wet weather and heavy rainfall patterns in December, there was a renewed incidence of root and crown rot on vegetable crops caused by the rapid spreading of motile zoospores as the principal infection agent. Incessant rain, saturated soils, slow drainage and reduced oxygen content in the rhizosphere, contributed to an increase in root and crown rot.

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New alien invasive beetle in Europe

The Biosystematics Division’s leaf beetle taxonomist, Beth Grobbelaar, is currently collaborating with specialists at the Istituto per la Protezione Sostenibile delle Piante (IPSP), Portici, Italy regarding the characterisation of Lema bilineata (Germar), a new alien invasive species in Europe. Following its introduction into Europe, it was positively identified by Michael Schmidt, a German systematist specialising on the subfamily Cricocerinae. Native to South America, this beetle is also invasive in South Africa, having probably been introduced from Argentina in horse feed during the Anglo Boer War. It successively spread to Zimbabwe and then Australia. To distinguish this insect effectively from Lema daturaphila Kogan & Goeden, a related species with a similar host range and invasion history in South Africa, a better understanding of the characterisation of the two species is required. To achieve this, photographic images of specimens from both Italy and South Africa, including images of the genitalia, have been produced; specimens were also subjected to molecular analyses. These images and analyses elucidate the chromatic and other variation within L. bilineata. This information, as well as data of the closely related alien invasive species in South Africa – L. daturaphila, was first presented as a collaborative poster at the XI European Congress of Entomology, 2-6 July 2018, Napoli, Italy (Third European Symposium on the Chrysomelidae): Monti, M.M., Parrella, G., Grobbelaar, E., Troiano, E. Grippo, R.V., Ucciero, E. & Pedata, P.A. Morphological and molecular characterization of Lema bilineata, a new invasive alien species for Europe. Final collation of all the research data was disseminated in the collaborative publication: Monti, M.M., Ruocco, M., Grobbelaar, E. & Pedata, P.A. 2020. Morphological and molecular characterization of Lema bilineata (Germar), a new alien invasive leaf beetle for Europe, with notes on the related species Lema daturaphila Kogan & Goeden. Insects 11 (5), 295. doi.org/10.3390/insects11050295. This article forms part of the Special Issue ‘The Borderless ”Bug” Characterization of Invasive Insect Species: The First Step for Their Control’. These published data will provide a means of efficiently recognising these beetles at points of entry, thus preventing potential new introductions and will facilitate prompt implementation of eradication measures, subsequent to field inspections.

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According to their newsletter Du Roi Laboratory (Letsitele, Limpopo), South Africa’s leading banana tissue culture facility, has obtained the rights for the field evaluation and eventual commercialisation of the Formosana variety, a Panama disease (FOC TR4) resistant variety. This strain of Panama Disease is devastating to banana growers across the world, severely impacting their profitability and the success of the global banana industry. Du Roi Lab has signed an agreement with the owners of the variety, the Taiwan Banana Research Institute (TBRI), to evaluate Formosana in banana producing countries in Africa and Central and South America. The intention of TBRI and Du Roi Lab is to commercialise Formosana following successful commercial trials. Formosana shows great potential in managing Fusarium based on successes in the Philippines and Mozambique. The Du Roi newsletter is available at https://mailchi.mp/duroilab.co.za/news-from-du-roi-laboratory-1921465?e=3a82d3c15b

ARC’s in vitro Genebank and the diagnostics laboratories at Roodeplaat are registered by Department of Agriculture, Land Reform and Rural Development (previously DAFF), and are therefore strategically placed to process all imported samples to be tested for quarantine organisms before being released. An exceptionally large consignment was recently imported by Du Roi Laboratory, and has been processed and tested by ARC Roodeplaat in conjunction with Du Roi’s Suné Wiltshire and laboratory manager, Jane Ramothwala. Batches of banana plantlets were imported by Du Roi recently and this material was received by Ms Nokuthula Myeza, manager of the in vitro Genebank at ARC-VOP that were responsible for apportioning of samples, after which sub-samples were tested for viruses, bacteria and fungi at ARC-PHP. These samples are being kept in quarantine and will be released to Du Roi after testing is completed.

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A forest dwelling button spider, *Latrodectus umbukwane* Wright, Wright, Lyle and Engelbrecht, commonly known as the Phina button spider has been described as new. The species is easily recognised by its egg sacs, which are smooth, large and bright purple when laid, becoming shiny grey as they mature. *Latrodectus umbukwane* was delineated using both morphological and molecular methods. This spider has been assessed and listed as Data Deficient (DD) on the IUCN Red List, due to the uncertainty of its distribution.


Another nine new species of trapdoor spiders of the genus *Lepthercus* Purcell, 1902 has been described. Taxonomic work has not been done on this in more than 100 years. Redescriptions of the *L. dregel* Purcell, 1902
and L. rattrayi Hewitt, 1917 are included, along with the female of L. rattrayi which was previously unknown. A paper reporting these discoveries, includes a phylogenetic analysis and morphological characters that shows there are two different clades. The first clade is the ‘Group haddadi’ that is characterized by males with a curved metatar sus I and a swollen tibia I. The second clade, namely ‘Group dregei’ is characterized by small maxillary cuspules in males. In the paper, the morphology characters needed to clearly define and recognise the genus are included, along with a comprehensive identification key to help other with identifications. Distribution maps are included and the authors also make notes on the geographic distributions of these two groups in South Africa. They show interesting and important biogeographic zones. ‘Group haddadi’ appears to be more related to the Fynbos Biome of the Western Cape Province and the Indian Ocean Coastal Belt Biome. A region that is known for its winter rainfall. While the ‘Group dregei’ is found from the eastern high summer rainfall areas of the country, and largely limited to the Grassland and Savanna Biomes. These species are found in the KwaZulu-Natal and the central parts of Eastern Cape Provinces. The topography is mainly flat to rolling and are dominated by a single layer of grasses.

Exceptions to this divide are the species L. rattrayi and L. dregei, with the L. rattrayi occurring within the Albany Thicket biome, and the type locality for L. dregei occurring on the transition between Fynbos and Albany Thicket on the Zuurberg mountains.

These new species are L. dippenaarae sp. nov., L. engelbrechti sp. nov., L. haddadi sp. nov., and L. sofiae sp. nov., are part of the denominated “Group haddadi”. It also includes L. rattrayi Hewitt, 1917 in this clade. The remaining new species, L. confusus sp. nov., L. filmeri sp. nov., L. kwazuluensis sp. nov., L. lawrencei sp. nov. and L. mandela sp. nov. are included with Lepthercus dregei Purcell, 1902 to form the clade ‘Group dregei’.

This paper is a collaborative work between PHP’s Robin Lyle, and Dr Duniesky Rios-Tamayo from CONICET – The National Scientific and Technical Research Council in Argentina. He visited the National Collection of Arachnida for the last 6 months of 2018, on a CONICET post-doctoral scholarship. This is the first paper from the work done by Dr Rios-Tamayo during his visit. Through this work, a genus previously hard to identify, is better understood. Many of the trapdoor species are endemics but the literature is old with poor keys or very poor descriptions.

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The emergence of novel strains of bacteria that nodulate and fix nitrogen in legumes

Recent developments in the study of legume–rhizobium symbiotic interactions, particularly those related to the emergence of novel strains of bacteria that nodulate and fix nitrogen in legumes, are evoking much interest. Novel strains of bacteria, mostly from the root nodules of indigenous and invasive legumes belonging to the subfamilies Papilionoideae and Mimosoideae in South Africa, South America and South East China have been isolated. These rhizobia are phylogenetically and taxonomically different from the traditional ‘alpha rhizobia’ and are termed ‘β-rhizobia’ as they belong to the β-sub class of Proteobacteria. There are also new reports of novel species of root nodulating bacteria from the α-Proteobacteria, unknown since the discovery of rhizobia, several decades ago. A review by Hassen et al. focuses on the emerging β-rhizobia, isolated from the indigenous Papilionoid legumes in the Cape Floristic regions in South Africa and the indigenous and invasive Mimosoid legumes in South America and South East Asia respectively. The nodulation of the indigenous South African Papilionoid legumes including that of Aspalathus linearis (rooibos) are discussed. Considered to be highly specific in its rhizobium requirement, previous reports indicated that A. linearis was nodulated by the slow growing Bradyrhizobium spp. This review however, shows that the bacteria associated with the root nodules of A. linearis belong to members of both the alpha (α) Proteobacteria that include Mesorhizobium, Rhizobium and Bradyrhizobium spp. and the beta (β) Proteobacteria represented by the genus Burkholderia (now reclassified as Paraburkholderia). In addition, the occurrence of Paraburkholderia as the newly emerging root nodule symbiont of various other legumes is discussed. The review therefore highlights that nodulation is no longer restricted to the traditional ‘rhizobia’ group, following the emergence of the new β-rhizobia as potential nodulators of various indigenous legumes. This provides new insight and challenges the long-held view on host specificity of the legume–rhizobium symbiosis.


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New species found in mouldy dogfood

The Mycology Diagnostic Services received over 400 samples from 62 different clients for processing during the 2019/20 financial year. Our client base is varied and includes, amongst others, conservation agencies, farmers and farmer groups, agro-chemical organisations, researchers, government phytosanitary services, food and hygiene industries, nurseries and producers of biological products. Previously, where molecular identifications were done on request only, these are now done routinely, in an effort to improve our service. This authenticates the identifications, and decreases the turnaround time in forwarding results to clients.

One of the spinoffs of rendering this service is the acquisition of new material, which may contain new species to science. Recently, two unusual consignments were submitted, each resulting in the description of a new species. The first species, Penicillium cuddlyae, was isolated from mouldy dogfood and by privilege, named after Cuddles the Dachshund (canine companion of the Biosystematics’ Research Team Manager). Penicillium is a group of fungi best known to be involved in food spoilage and the production of antibiotics. The second species, Talaromyces clemensii, was named after the person who assisted with sample collections from a gold mine in Mpumalanga province. Species of this genus have aggressive colonization strategies, are common in soil and adaptable to extreme environmental conditions, and are often associated with decaying plant and food material.

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Eccentric man’s orphaned collection boosts value of SANC

The SA National Collection of Insects (SANC) received the private insect collection of Dr Richard Watmough, erstwhile insect ecologist at ARC-PPRI, following his death in 2005. The SANC curators were aware that among the unsorted specimens in the cabinet particularly valuable specimens could be hidden. As confirmed bachelor and celebrated eccentric, Richard’s joy was crisscrossing tracts of southern Africa seldom visited. With his beloved Mountain Club, he explored many places where truly odd and unique insects live. Subsequently some unique species in this collection were recognised by specialists and at times published as new species.

Recently two exciting **Colophon** specimens were found. The Cape Mountain Stag Beetles, genus *Colophon*, are relicts from when the Cape was a low-lying, tropical swamp. Now, millions of years later, these beetles cling to the highest mountaintops as the last outposts of their survival. They are of inherent conservation concern, evolutionary ancients that should have naturally gone extinct long ago. Their future existence is threatened by habitat destruction, by climate change, and by the insatiable demand for Colophon specimens by wealthy beetle collectors in the Global North. All species of *Colophon* enjoy the highest levels of official protection in South Africa, besides which they are the only African insects listed by CITES.

Two *Colophon* specimens in the Watmough collection belonged to two different species, both of which are among species newly described in 2015. The value of these specimens is accentuated by the facts that the SANC specimen of one species is only the second specimen ever found; and of the second species there had been only two previously known specimens. Colophon beetle specimens have an estimated trade value of USD 15 000.

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Avicides applied over migratory quela birds

Organophosphate avicides are primarily applied using aircraft after sundown over thorn bush roosting sites and breeding colonies of Redbilled quela birds (*Quelea quela*, Lathamii) to prevent damage to small grain crops in South Africa. The Department of Agriculture, Land Reform and Rural Development (DALRRD) approached the ARC for technical support and expertise in the calibration of the aircraft to ensure efficient and safe use of pesticides for the control of migratory pests and their impact on agricultural production and food security.

The Pawnee D (PA-25-235) fixed-wing spray aircraft was one of the first aircraft designed specifically for aerial spraying and crop dusting purposes. The aircraft is powered by a Lycoming O-540 260hp engine with fuel tanks fitted in the outer wings and, has a range of 500km. The hopper carrying capacity is 565 ℓ. The aircraft is equipped with six Micronair® AU 5000 rotating cage atomising spray heads (three spray heads per wing). Each of the spray heads has an adjustable volume restrictor unit (VRU) which can be set to obtain the recommended flowrate. Calibration of the wind-driven impeller pump provides logistical difficulties as the pump only attains the correct spraying pressure (15 p.s.i. or 1.03 bar) and flow rate when the aircraft reaches its operational air speed of 70 knots (approx. 130 km.h⁻¹). In order to obtain accurate flow rate measurements during operational speed of 130 km.h⁻¹, calibration canisters were developed which are
The fungal genus *Fusarium* are some of the most significant plant pathogens worldwide. Additionally, their toxin producing ability can have devastating effects on human, animal, and plant health, and they can cause fatal diseases in immunocompromised humans. To establish the distribution of *Fusarium* in South Africa, our programme surveyed undisturbed soils from the grassland biome of South Africa and the Karoo basin, from 2014-2019. The programme is a collaboration between the NCFG (ARC- PHP), the University of Johannesburg, and the Royal Botanic Garden Sydney, Australia. Results generated by the study provided the isolation of several new species and provided new distribution records and geographical patterns for a number of phytopathogenic species of *Fusarium*. This rich biodiversity warrants the inclusion of more sampling points within other biomes in South Africa for comparison. The next phase of the study (2020-2022) will include unique arid ecosystems in South Africa such as the Kalahari. Combined analyses of all these data will increase our knowledge of the species richness of an important plant pathogenic genus under natural, slightly disturbed and disturbed soil and provide baseline knowledge for future comparisons between degraded and non-degraded soils that will contribute towards more informed decisions on conservation strategies. The incorporation of these strains into the National Collection of Important plant pathogenic genus, *Fusarium*, surveyed in South African soil

The fungal genus *Fusarium* are some of the most significant plant pathogens worldwide. Additionally their toxin producing ability can have devastating effects on human, animal, and plant health, and they can cause fatal diseases in immunocompromised humans. To establish the distribution of *Fusarium* in South Africa, our programme surveyed undisturbed soils from the grassland biome of South Africa and the Karoo basin, from 2014-2019. The programme is a collaboration between the NCFG (ARC-PHP), the University of Johannesburg, and the Royal Botanic Garden Sydney, Australia. Results generated by the study provided the isolation of several new species and provided new distribution records and geographical patterns for a number of phytopathogenic species of *Fusarium*. This rich biodiversity warrants the inclusion of more sampling points within other biomes in South Africa for comparison. The next phase of the study (2020-2022) will include unique arid ecosystems in South Africa such as the Kalahari. Combined analyses of all these data will increase our knowledge of the species richness of an important plant pathogenic genus under natural, slightly disturbed and disturbed soil and provide baseline knowledge for future comparisons between degraded and non-degraded soils that will contribute towards more informed decisions on conservation strategies. The incorporation of these strains into the National Collection of Important plant pathogenic genus, *Fusarium*, surveyed in South African soil

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Delegates who attended the 13th Colloquium of the African Arachnological Society held at Klein Kariba from the 19-13 January 2020.

The 13th African Arachnology Society (AFRAS) colloquium was held from 19 to 23 January 2020 at the ATKV Klein Kariba Resort, hosted by the University of Venda and the ARC. The aim of these colloquia is to promote research on African Arachnida (non-Acari) and to provide a platform for researchers and students to share their work formally and informally. The colloquia are characteristically small, with 30 delegates attending the event in January. Both national and international delegates attended, with international representatives from Russia, Belgium, Canada, Nigeria and Namibia to mention a few.

A total of 25 papers and six posters were presented over the three days, with a workshop held on each day. Two of the workshops, both presented by Dr Galina Azarkina from Russia, focused on Salticidae, a large and diverse family, commonly known as jumping spiders. One workshop dealt with the editing of photographs and scientific drawings, while the other focused on a taxonomic key to the different genera of Salticidae. A very interactive third workshop, where many ideas and concepts were discussed, was presented by Dr Danilo Harms from Germany, on southern African arachnid diversity and large scale diversity studies of southern African arachnid fauna.

Contact: Dr Adriaana Jacobs-Venter at JacobsR@arc.agric.za

ARC-PHP participated at Virology Africa 2020

Coinciding with the International Year of Plant Health, the Virology Africa 2020 Conference was held from 10-14 February 2020 in Cape Town. The academic programme included plenary sessions presented by internationally recognised experts, in addition to a variety of other presentations dealing with plant, human, animal and bacterial virology. ARC-PHP and CapeBio attended the conference as part of a joint venture to gauge consumer perception and potential market penetration of the Viridi® Elisa Kits. A joint display, showcasing the ARC’s Viridi® Elisa Kits, along with information and brochures of CapeBio’s other products was presented. Marketing materials included banners, packaging and packaging inserts. Healthy and diseased plants were also on display. The conference was an ideal opportunity to engage with existing and potential clients. Details of prospective clients were recorded for future follow-up.

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13th Colloquium of the African Arachnology Society

Fungi ensures their long-term storage and access to other researchers and the survey has, to date contributed 1300 barcoded strains, with an additional 1000 to be barcoded. This is a continuation of the long-standing surveillance catalogued in the MRC PROMEC collection (now housed at the NCF). Additionally, it will expand our current knowledge of fungal diversity and support various research infrastructures in South Africa as NGS data have been generated for all the sampling sites for which the *Fusarium* fraction has been isolated, representing the complete fungal fraction of these sampling sites.

Contact: Dr Adriaana Jacobs-Venter at JacobsR@arc.agric.za
New book on invasive alien plants launched

Renowned Botanist and author, Lesley Henderson of ARC PHP, has launched her latest book, “Invasive Alien Plants in South Africa”, that follows on from her previous publication “Alien weeds, and invasive plants”. The new full colour, glossy 384-page field guide provides species accounts and descriptions of over 400 of the most prevalent invasive alien plants listed under the NEMBA Act. Colour coding of major plant groups, as well as high quality photographs and descriptive symbols, make for easy identification by amateur botanists and the public. The publication of this book was funded by the DEA: Natural Resource

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New blight species reported from imported nectarines

A brown rot sample isolated from imported nectarines was recently identified as *Monilinia fructicola* based on sequence data of the ITS spacers 1,4. Sequence data of isolate M1227 matched entries in Genbank up to 100% sequence identity. Species of *Monilinia* (Ascomycota, Helotiales, Sclerotiniaceae) are pathogenic on pome and stone fruit species of the family Rosaceae, causing blight of the blossoms, twigs and branches, as well as fruit rot. The host range of *Monilinia* comprises apples, pears, quinces, cherries, apricots, plums, peaches, nectarines etc. The genus has been recorded from Australia, New Zealand, North and South America and Japan. A survey conducted of stone fruit orchards in South Africa in 2010 did not detect *M. fructicola* in orchards.

*Monilia fructicola* (ref. 2019-M116/424), was reported on 7 November 2019 to the Director, Plant Health/Executive Officer of the Agricultural Pests Act of 1983; Dept. Agriculture, Land Reform & Rural Development, as a First Report on the Quarantine or New Pest of Plants Report.

Contact: Dr Wilelm Botha at BothaW@arc.agric.za
Anthracnose symptoms on papaya fruit

Postharvest pathogens result in major losses to subtropical fruit production worldwide. One of these pathogens is anthracnose, caused by various Colletotrichum species, responsible for pre- and post-harvest disease. Results from surveys done in 2014 and 2015 in Vhembe, Limpopo and the rest of Limpopo in 2017, as well as in Mpumalanga, revealed that large amounts of fruit were discarded by smallholder farmers, mostly due to infection by Colletotrichum species. This study also revealed eight Colletotrichum species associated with anthracnose symptoms, five of which have not previously been recorded from papaya in South Africa. Results of characterization and pathogenicity, as well as cross-infection potential on other fruits, has recently been reported to DA LRRD.

These data will not only improve government regulations and management strategies, but will also facilitate fast and efficient detection methods. This will enable implementation of timely control measures, which should subsequently result in increased quality of produce and improved shelf life throughout the value chain. From an entirely scientific perspective, these results will provide baseline information for further taxonomic research pertaining to the identity, geographic distribution and phylogenetic

First report of the dagger nematode, Xiphinema oxycaudatum, from South Africa

In an effort to determine the soil health of an abandoned honeybush tea (Cyclopia genistoides) monoculture plantation, soil samples were obtained from Genadendal, an old mission station in the Western Cape province of South Africa. A high population of the plant parasitic dagger nematode, Xiphinema oxycaudatum Lamberti and Bleve-Zacheo, 1979, was recorded in the rhizosphere of the tea plants. It is a polyphagous and cosmopolitan nematode, which was first described from the rhizosphere of oil palms (Elaeis guineensis) in Nigeria. In the present study, soil samples were taken from the rhizosphere of plants, and nematodes were extracted from the soil using a modified extraction tray method. Morphological identification and molecular profiling of the nematode species were done to provide an accurate diagnosis and to distinguish the species within the Xiphinema americanum-group. Phylogenetic analysis based on the D2D3 expansion segment of the 28S gene supported a close relationship within the species, while the protein-coding cytochrome oxidase (COXI) of the mitochondrial gene provided a useful tool for distinguishing the nematode from other species within the X. americanum group. This study represents the first report of X. oxycaudatum from South Africa.

Contact: Dr Antoinette Swart at SwartA@arc.agric.za

New species of anthracnose recorded on papaya in South Africa

Postharvest pathogens result in major losses to subtropical fruit production worldwide. One of these pathogens is anthracnose, caused by various Colletotrichum species, responsible for pre- and post-harvest disease. Results from surveys done in 2014 and 2015 in Vhembe, Limpopo and the rest of Limpopo in 2017, as well as in Mpumalanga, revealed that large amounts of fruit were discarded by smallholder farmers, mostly due to infection by Colletotrichum species. This study also revealed eight Colletotrichum species associated with anthracnose symptoms, five of which have not previously been recorded from papaya in South Africa. Results of characterization and pathogenicity, as well as cross-infection potential on other fruits, has recently been reported to DA LRRD.

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relationship between species of the genus. In addition, fungal isolates resulting from this study will be contained in the National Collection of Fungi’s live culture collection (acronym PPRI), thus expanding and enhancing the collection. Results of this study, which are to be published in an international journal, form part of an MTech thesis by Ms Prudence Mtshweni, who was recently awarded a “Woman in Science” award.

Contact: Prudence Mtshweni at MtsweniN@arc.agric.za

A first checklist of macrofungi for South Africa

Macrofungi are considered fungi that form large fruiting bodies above or below the ground that are visible without the aid of a microscope. These fungi include most basidiomycetes and a small number of ascomycetes. Macrofungi have different ecological roles and uses including as food source, medicine, decomposers, saprotrophs, predators and pathogens, and they are often used for innovative biotechnological, medicinal and ecological applications. However, comprehensive checklists, and compilations on the diversity and distribution of mushrooms were lacking for South Africa. This hampers regulation, conservation and the inclusion in national biodiversity initiatives. The South African National Collection of Fungi, PREM collection, contributed to a South African checklist of macrofungi as part of a collaboration between the University of the Free State, South Africa, University of Bamenda Cameroon and Karatina University, Kenya. The checklist encompasses all available literature in journals, books and PREM fungorium records. Even if the list is not complete due to numerous unreported species present in South Africa, it still represents an overview of the current knowledge of the macromycetes of South Africa. The list of names enables the assessment of gaps in collections and knowledge on the fungal biodiversity of South Africa, and downstream applications such as defining residency status of species. The publication (Kinge et al., 2019) A first checklist of macrofungi for South Africa. MycoKeys. https://doi.org/10.3897/mycokeys.36566) provides a foundation for new names to be added in future towards developing a list that will be as complete as possible, and that can be used by a wide audience including scientists, authorities and the public.

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SCIENTIFIC PUBLICATIONS


**CHAPTERS IN BOOKS**


**PHD THESES**

Rene Carlson. PhD Plant Pathology University of Pretoria. “Rhizobacteria induced priming against biotic and abiotic stress in the sorghum crown rot pathosystem”, PhD in Plant Pathology, University of Pretoria, NRF linked bursary.

**MASTERS THESES**

Khumbudzo Mashau. MSc Microbiology University of Pretoria. “Symbiotic nitrogen fixation efficiency of native rhizobia on selected legumes important in South Africa”, Degree MSc in Microbiology, University of Pretoria. NRF linked bursary.