

FRUITOPIA

ARC-TROPICAL AND SUBTROPICAL CROPS NEWSLETTER

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Dear Colleagues !

WE asked for a *FUNKY* name in the first newsletter. You voted and the outcome was:

“Fruitopia”



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CONFERENCES

LOCAL IS LEKKER - *Indigenous Knowledge Systems in Economic Development Conference*

THE Indigenous Knowledge Systems in Economic Development Conference was held in Johannesburg from 30 November - 2 December 2016. **Ms Rosemary Du Preez** presented a paper titled "Indigenous Fruit for Development as Commercial Crops for Southern African Resource-Poor Farmers" and was also a session chairperson. The objective of the conference was to address strategic issues surrounding Indigenous Knowledge Systems (IKS),

economic development, food security and climate change. Some of the key strategies discussed included transformation of IKS activities into professional business practices, building capacity of emerging researchers and other stakeholders, expansion of IKS in the health, arts, culture and tourism sectors, new opportunities for development, etc. The challenge remains to ensure that the holders of IKS are the beneficiaries of initiatives. ■



Several indigenous fruit species including Kei apple (left), mangosteen (middle) and marula (right) have enormous potential for development as commercial crops for resource-poor farmers

TRAINING INITIATIVES

Village Training



AS part of ongoing work, **Ms Rosemary Du Preez** and **Ms Karen de Jager** are involved in visiting several villages that receive training on subtropical crop production practices, organisation and management of village structures and co-operatives, caring for trees, pest control and record keeping. The

continued support and assistance is critical to ensure that village organisations and co-operatives become self-reliant and sustainable. In addition, discussions were held with stakeholders in Dedeni to discuss the potential for the development of a soap-making initiative. Towards this end, herbs were planted at

Dedeni and moulds for making soaps were obtained for the village. The agro-processing development in the villages currently allows for niche marketing and the challenge is to ensure that production increases as demand for the products grows. ■



Left: Banana production practices and soap-making training (right)

INDIGENOUS PLANTS

Saving the Pepperbark tree

In the Kruger National Park, illegal, non-sustainable bark harvesting of the pepperbark tree



Pepperbark seedlings ready for distribution

(*Warburgia salutaris*), has resulted in the deployment of rangers to protect trees to prevent total destruction of the remaining populations. In order to conserve the species and to reduce pressure on wild populations, **Dr Karin Hannweg** and collaborators have been working on the refinement of propagation methods, particularly those that could be adopted by communities to propagate their own trees. Despite extensive investigations, successful micropropagation of this species remains a challenge. A simple and cost-effective method for the propagation of *W. salutaris* using micro-cuttings was established. This method has potential for adoption by neighbouring communities. Moreover, there are spinoffs in terms of small business development (establishment of nurseries) and wealth creation in these impoverished areas. ■

CROPS

Macadamia

Integrated breeding to improve **MACADAMIA**

THE South African macadamia industry is the largest in the world and is one of the fastest growing tree crop industries locally. One of the highest-yielding cultivars is HAES 814, however, the nuts produced are small and break easily. As part of the integrated breeding and improvement programme, **Dr Karin Hannweg** and **Mr Mark Penter** are investigating the potential of induced polyploidy, to develop a polyploid HAES 814 selection. Plant breeders have used this tool to breed crops with advantageous traits (higher yields, larger fruit, dwarfing characteristics, tolerance to heat, cold, drought, pests and diseases). Marketable characteristics such as increased nut size and decreased shell thickness for macadamia are highly sought after and could potentially be altered through induced polyploidy. Bud-wood of HAES 814 was treated, grafted onto rootstocks and one pure polyploid shoot was verified using flow cytometry. A high-yielding, high quality macadamia cultivar could

significantly further increase the South African macadamia market share on global markets. ■



Cultivar HAES 814 (left): high-yielding macadamia cultivar with small, fragile nuts. HAES 695 (right) has a lower yield with larger nuts

Guava



Bacterial antagonists control fungal disease in **GUAVA**

THE guava industry in South Africa is under severe threat by guava wilt disease (GWD) caused by the fungus *Nalanthamala psidii*. This devastating disease results in tree decline and ultimately death and can spread rapidly through a production area.

Control measures for GWD, other than eradication of diseased trees, do not currently exist. Research towards biological control using beneficial microbes undertaken by **Mrs Maritha Schoeman** and collaborators, showed that the rhizobacterial strains of *Bacillus cereus* and *Paenibacillus alvei* could suppress the disease. Furthermore, these microbes also appeared to enhance plant growth.

This is the first report of control of GWD using bacterial antagonists and could provide an environmentally-friendly and effective means of disease control for guava producers in South Africa. ■



Application of beneficial microbes facilitates the suppression of GWD

PESTS

Environmentally-friendly management of nematode pests

NEMATODE pests cause substantial yield losses to a range of crops worldwide. **Dr Mieke Daneel**, in collaboration with their partners, are exploring environmentally-friendly nematode control strategies as alternatives to chemical control in efforts to conserve natural resources and the environment. Nematode pests are generally managed successfully by

the use of synthetically-derived nematicides however these are progressively being removed from world markets. The inclusion of Brassicaceae crops in cropping systems is one such alternative and has been demonstrated in most cases to be effective in managing economically-important

nematode pests, viz. root-knot (*Meloidogyne*), cyst (*Heterodera* and *Globodera*) and lesion (*Pratylenchus*) nematodes, as well as others. A critical appraisal of the role of these crops has led to the initiation of Brassicaceae-based management strategies and biofumigation in reducing nematode-pest population levels in global cropping systems. ■



Brassica nematode trial to determine optimum nematode management strategy.



Typical damage to tomato roots caused by root-knot nematode infestation.

Biological control of insect pests

A desktop study to determine the potential of a biological product containing a specific entomopathogenic (EPN) nematode for biological control of pests was undertaken by **Dr Mieke Daneel**. The study investigated potential contamination of endemic EPN species by the active organism as well as the possibility of it attacking non-target species. The study revealed that this organism, as well as other EPNs, are safe and effective biological control agents and are more specific and less of a threat to the environment and human health than chemical pesticides. Indigenous EPNs are being investigated for the biological control of the nut borer complex on macadamias and false codling moth in avocados in

South Africa. To date, research has shown that several isolates appear to be virulent against the pests. ARC-TSC scientists (**Mr Willem Steyn** and **Dr Mieke Daneel**), in collaboration with Stellenbosch University, are in the process of describing a completely new *Steinernema* species which was isolated from a field site. This research could lead to the biological control of the nut borer complex and soil stages of false codling moth, economic pests causing substantial losses to the macadamia and avocado industries. ■



Entomopathogenic nematodes (infective juveniles) emerging from moth larvae
(Photos: W. Steyn)

Fruit fly monitoring in MANGO production areas

THE response of fruit flies to lures is critically important, particularly when a single lure might be recommended for the purpose of trapping multiple fruit fly species in commercial fruit orchards. Several South African subtropical fruit industries are facing threats from the recent invasion of the oriental fruit fly *Bactrocera dorsalis* (Hendel) into production areas in South Africa where the species was not found previously. **Dr Tertia Grové** and her team undertook research towards testing the efficiency of

different fruit fly trapping systems in mango orchards in the Limpopo Province. The results showed pronounced variation in species attractiveness across the trapping systems and lures tested. These results are important and significant for on-farm monitoring strategies, as well as for invasion monitoring systems currently in place to detect the distribution of *B. dorsalis* in South Africa and allows mango producers to implement timely and effective control strategies in their orchards to ensure that quality fruit is exported to international markets. ■



Mango fruit fly (left) and Oriental fruit fly (right) must be detected and monitored for the development of effective control strategies in mango orchards

Climate Change Research

AS part of the Climate Smart Project, **Dr Karin Hannweg and Mr Mark Penter** are currently characterising the differences between polyploid and diploid *Plectranthus esculentus* plants. This species is being used as a model crop to investigate the effects of polyploidy on crop plants including tolerance to several climate change stressors. They determined that the polyploids had a significantly higher chlorophyll content index than the diploid progenitors. Chlorophyll is essential for the conversion of light energy to stored chemical energy and chlorophyll content can directly determine photosynthetic potential and therefore primary production. Furthermore, preliminary studies demonstrated that the induced polyploids had a higher assimilation (i.e. photosynthesis) rate than the diploid plants. Initial studies using CO₂ response curves revealed that induced polyploids had a different response to the diploid plants. Investigations on the polyploids' improved ability to photosynthesize under reduced water (drought-stress), increased temperatures and CO₂ levels could facilitate prediction of performance under abiotic stress factors associated with climate change. ■



Plectranthus esculentus diploid (left) and tetraploid (right) plants

STAFF NEWS

NEW APPOINTMENTS

Mr André Slabbert

IN November 2016, Mr André Slabbert joined the ARC as the new Farm Manager for Addo research station. Prior to joining the ARC, Mr Slabbert worked at Afrifresh in KZN as the Citrus and Banana Production Manager. He has also worked as the Farm and Operational Manager for NADEC at Saudi Arabia and as a Farm

Manager at a farm in the Sundays River valley. He holds a National Diploma in Agriculture from Grootfontein Agricultural College.



Operation Phakisa

OPERATION Phakisa is a programme that was launched in 2014 to help implement the National Development Plan. The goal of Operation Phakisa is to boost economic growth and create jobs.

This initiative involved engagements with various stakeholders from the public and private sector, academia and civil society to undertake a detailed analysis of issues, set priorities, identify constraints and plan interventions towards addressing the goals set out in the National Development Plan, particularly relating to critical development issues surrounding poverty, unemployment and inequality. Dr Mduduzi Ngcobo represented the ARC at these important discussions.

Ms Precious Joubert

Ms Precious

Joubert was appointed as a Cashier at ARC-TSC on 1 October 2016. Before joining the ARC, Ms Joubert was employed by Kelly and Quest Recruitment

Agency starting as a receptionist and she worked her way up to Payroll Administrator, Recruitment Consultant, Creditors Clerk and Operational Administrator. She is currently studying towards an ICB National diploma in Technical Accounting at Unigrad College.



Dr Mduduzi Ngcobo was invited to participate in Operation Phakisa

WELCOME ANDRÉ AND PRECIOUS !





THANK YOU to all those who contributed to
this **THIRD ISSUE** of the
ARC-Tropical and Subtropical Crops
NEWSLETTER