

FRUITOPIA

**ARC-TROPICAL AND
SUBTROPICAL CROPS**

NEWSLETTER

January - June 2017

Issue No. 4





IN THIS ISSUE

Page no.

International and local news	1
Exhibitions	3
Training Initiatives	4
Crops	4
• Citrus	4
• Litchi	6
• Guava	7
• Granadilla	8
• Nematodes	8
• Banana	9
Indigenous plants	10
Awards	11
Staff news	12



ARC-TSC, Private Bag X11208, Nelspruit, 1200

Corner of Bosch Street and Ka Nyamazane Rd R2296

Tel. 013 753-7000 • Fax 013 752-3854

E-mail: infoitsc@arc.agric.za • Web address: www.arc.agric.za

EDITORIAL COMMITTEE MEMBERS:

Editors:

Dr Karin Hannweg

Dr Elliasha Hajari

Layout & Graphic design:

Estelle Nieuwenhuis

To contribute to the Newsletter

send your contributions to:

Karin@arc.agric.za

or

HajariE@arc.agric.za

INTERNATIONAL NEWS

Visit to Guangzhou, CHINA

In March 2017, Ms Regina Cronje and Dr Lynn Hoffmann, from Stellenbosch University, were invited by Prof. Houbin Chen, Dean of the College for Horticulture at the South China Agricultural University (SCAU), to discuss a bilateral project between ARC and SCAU. During her visit, Regina was trained in RNA extraction methodology for gene expression profiling

and identification of specific genes regulating flowering, so that she can use it for her studies in South Africa.

During her visit, Regina also visited a few litchi orchards in Guangzhou and Shenzhen together with researchers from SCAU during which research projects and orchard management practices were discussed. ■



Regina Cronje together with Dr Lynn Hoffmann (Stellenbosch University) and the Litchi Research Team from the South China Agricultural University



The very late cultivar Lingfengnuo topworked on a 300-year old rootstock (left). Top-working is mainly done by bark grafting to reduce incompatibilities (right)

CONFERENCES - NEW ZEALAND

DR Elliasha Hajari participated in the 4th ISHS Symposium on Molecular Markers in Horticulture held in Napier, New Zealand from 7-10 March 2017.

The symposium brought together scientists and post-graduate students specialising in molecular marker research from China, Japan, India, Italy, Spain, USA, Mexico, Australia, New Zealand, Philippines, Chile and Thailand. The topics covered included markers for biotic and abiotic stress, markers for traits, molecular technologies, selection strategies, genetic diversity and molecular genetics. ■



Dr Elliasha Hajari with delegates from Griffith University, Australia



Delegates at the ISHS Symposium on Molecular Markers in Horticulture

ISHS Symposium on Flowering, Fruit Set and Alternate Bearing in Palermo, Italy, June 2017

Ms REGINA Cronje attended and presented at the 1st International Symposium on Flowering, Fruit Set and Alternate Bearing in Palermo, Italy, in June 2017, under the auspices of the International Society for Horticultural Science (ISHS). The symposium was attended by approximately 100 delegates from 25 different countries. There were presentations on the latest advances in all disciplines related to flowering, fruit set and alternate bearing in temperate, tropical and

subtropical tree crops. In the afternoon, the delegates enjoyed a tour through the Botanical Garden and the Palazzo Steri, which was used a prison during the inquisition in the 16th century. The technical tour took the delegates to a nursery for ornamental citrus as well as a farm producing subtropical crops, such as litchi, mango, avocado, longan and carambola amongst others. ■



Delegates at the 1st International Symposium on Flowering, Fruit Set and Alternate Bearing in Palermo, Italy



Regina Cronje with litchi researchers from China, Brazil and India during the technical tour

LOCAL CONFERENCES

Combined Congress 2017



THE annual Combined Congress for 2017 was held in Bela-Bela from 24 - 26 January 2017. As usual, the ARC-TSC had a good contingent of researchers and students presenting their work.

Dr Karin Hannweg won the award from the Southern African Society for Horticultural Sciences (SASHS) for the best paper published in an International peer-reviewed journal and **Ms Nikki Combrink** won the prize for the Best Poster. ■

Well done guys !!!



EXHIBITIONS

NAMPO

THE annual NAMPO Harvest Day was held near Bothaville from 16 -19 May 2017. The ARC-TSC was represented by **Ms Rosemary du Preez** and **Ms Karen de Jager**.

The exhibition this year was attended by more than 78 000 visitors with 700 exhibitors and showcased every aspect of agriculture in South Africa you can think of! ■



Some of the fruit and products on display



Ms Rosemary du Preez interacting with the visitors at the ARC-TSC stand



TRAINING INITIATIVES

MR Arthur Sippel and O Van Buynder organised a training workshop for mango producers from Ghana from 19-28 February 2017 at the ARC-TSC.

A number of staff members were involved in the programme including **Mr Christo Human, Dr Romeo Murovhi, Ms Bernice Kruger, Mrs Elsabé Aylward,**

Ms Salomie Willemse, Dr Mieke Daneel, Dr Tertia Grové, Mr Oscar Maphanga, Mr Moses Molope, Dr Nhlanhla Mathaba, Ms Karen de Jager, Ms Tsimangadzo Malindi, Mr Mark Penter and Dr Zelda Bijzet. All aspects of mango, macadamia and citrus cultivation and management were discussed. The training concluded with a visit to a mango farm. ■



Ms Karen de Jager with delegates getting hands-on training in the agro-processing unit



Delegates that attended the training

CROPS

CITRUS



Inheritance data: An important aid to the CITRUS breeder for fruit internal quality improvement

IMPROVEMENT of fruit quality is one of the main goals of citrus breeding programmes. However, information on inheritance of internal quality in citrus is lacking. **Ms N Combrink, Dr Z Bijzet and Mr A Sippel** undertook to accumulate inheritance data and incorporate this information into the breeding strategy, with a particular focus on mandarins. Results of this study showed that it is possible to improve fruit internal quality in citrus by using suitable breeding parents. ■



A targeted approach to citrus breeding results in the development of fruit with excellent internal quality characteristics

Testing female fertility in mandarin orange with controlled manual cross-pollinations

AS part of a collaborative study with Spain and Morocco, **Ms Nikki Combrink, Dr Zelda Bijzet** and **Mr Johan Husselman** investigated if controlled manual cross-pollination can be used as a method to distinguish fertility differences between mandarin cultivars. It was found that female fertility

was directly related to seediness, and the degree of female fertility could be accurately determined by controlled manual cross-pollination. This method provides a simple means to describe cultivar-specific differences in female fertility. ■



Controlled manual cross-pollination studies revealed that there were distinct differences in fertility and therefore seediness between cultivars

Fine-tuning of molecular genotype reference database for mandarins, lemons and limes

A collaborative project between Citrus Research International and the ARC-TSC (**Dr Elliasha Hajari** and **Ms Dzunisani Nonyane**) investigated fine-tuning of the molecular genotype reference database for mandarins, lemons and limes. New analysis methods were developed and applied which allowed for partial automation of the process

and minimised experimental error. From the work applied to lemons and limes, it was evident that one of the new analysis methods resulted in less time being spent on this process.

More importantly, it limited the variation observed between replicates and was able to resolve some of the concerns identified with the previous analysis. ■



Ms Dzunisani Nonyane analysing lemon samples in the molecular biology lab

Effect of shade net on fruit production of mandarin citrus

MR Nico Roets, Ms Regina Cronje and I Ngwamba investigated whether there are any real benefits in using shade nets as increasing numbers of mandarin growers consider covering their orchards with shade nets. This study investigated the effect of low-density white shade nets on tree performance (physiology), phenology, production and post-harvest storage potential and fruit quality of



'Nadorcott' mandarins. It appeared as if the net reduced the severity of alternate bearing. However, this needs further investigation. The study further found that fruit from the covered orchard were larger with higher juice potassium levels and lower TA levels, albeit results from fruit that were slightly greener during harvest. It was also found that the shade net had no effect on the post-harvest storage potential of 'Nadorcott' mandarin. ■

LITCHI

Effect of autumn water stress in combination with ethephon on flowering and yield of LITCHI, 'Mauritius'

Poor litchi flowering is a worldwide problem, especially in areas where temperatures during the flower induction period are not low enough. Ms Regina Cronje, Ms Innocent Ratlapane and Mr Sakkie Froneman investigated the effect of autumn water stress in combination with ethephon application

to control late autumn flush in order to improve flowering and yield over a four-year period using the cultivar 'Mauritius'. Water stress in combination with ethephon application successfully controlled vegetative flushing, increased flowering and yield compared with optimum irrigation in combination with ethephon application. Overall, the late water stress period was more beneficial in the warm production area (late flower induction) and the early water stress period more beneficial for the cooler production area (early flower induction). The use of ethephon with or

without water stress remains an indispensable orchard practice for litchi production. ■



*Trees that received water stress and ethephon applications during April flowered in July (left).
Trees that received full irrigation and no ethephon during April flushed in July (right)*





Weak production without water stress in April

Expanding the genetic diversity of the South African LITCHI germplasm collection

THE litchi breeding programme is currently being managed by **Mr Arthur Sippel** and the main aims of litchi improvement in South Africa are to extend the production season and to deliver cultivars with improved tree and fruit qualities. To achieve this, it is essential to expand the limited genetic base of cultivars currently available in South Africa. Recent collaboration with leading litchi-producing countries has led to the importation of 17 cultivars from Australia in 2013 and 13 cultivars from Israel in 2014. **Dr Eliosha Hajari and Ms Dzunisani Nonyane** developed a genotype reference database for litchis at the ARC-TSC using molecular marker technology. The reference database will serve as a tool in the characterisation of litchi cultivars and the establishment of a core collection of cultivars for future breeding work. ■



GUAVA breeding expanded to the Western Cape

GUAVA

THE presence of Guava Wilt Disease in the Mpumalanga and Limpopo provinces, as well as the demand for new, improved guava cultivars has prompted expansion of the ARC-TSC Guava Breeding program to the Western Cape. This project was undertaken by **Ms Salomie Willemse** and **Mr Christo Human**. The Western Cape government provided the Western Cape Guava Growers with funding to establish promising guava selections from the ARC-TSC breeding programme in the Western Cape. Twenty-eight promising selections and two controls successfully established at the Bien Donné Research Farm in the Western Cape as part of a collaborative effort between ARC-TSC and ARC-Infruitec. **Mr. Bongani Sokomani** of ARC-Infruitec (Research Technician) has enrolled for his MTech study on nematode resistance, GWD resistance and fruit quality screening. ■



Guava seedlings are planted by ARC-TSC and ARC-Infruitec personnel

GRANADILLA

GRANADILLA breeding moved to the Eastern Cape

ONE of the major reasons for low yields in granadillas is the short productive life of most plantings due to lack of disease tolerance, specifically viruses. Although the ARC-TSC bred a virus-tolerant selection that was registered during 2015, the breeding programme at Nelspruit still struggles to

keep other promising selections alive due to virus infections. For this reason it was decided to relocate the breeding programme to the Addo Research campus in the Eastern Cape, which although not a traditional granadilla production area, is currently a disease-free area for granadilla. ■



The new granadilla planting was established at Addo Research Campus and the plants are performing well under the Eastern Cape conditions

NEMATODES

Nematology in South Africa: A view from the 21st century

A number of researchers (**Dr Mieke Daneel, Dr Candy Khosa, Ms Grace Tefu and Ms Elmarie Rabie**) from the ARC-TSC contributed to a book on Nematology in South Africa: A view from the 21st century. The book gives a comprehensive

overview of the plant parasitic nematodes associated with a range of agricultural and horticultural crops, nematodes that infect humans and beneficial, marine and estuarine nematodes. ■



Nematodes cause severe crop losses throughout the world. ARC scientists were involved in both the editing of the book as well as significantly contributing to numerous book chapters

BANANA

Properties of unripe banana flour from 10 desert banana varieties cultivated in South Africa

UNRIPe banana flour is a potential commercial ingredient in various food products. **Dr Wokadala, Dr Mduduzi Ngcobo and Mr Johan Husselman** investigated the pasting, gel texture, thermal, colour and the resistant starch properties of unripe banana flour produced from

different dessert banana varieties cultivated in South Africa and compared with wheat and maize flours. The result indicated that selection of the appropriate dessert banana variety is important when replacing staple flours (wheat and maize) with unripe dessert banana flour as a functional ingredient. ■



*Left: Lucio Zuma and staff at Burgershall farm.
Right: Tshimangadzo Malindi, A M Zikhali and Joel Kongolo (TUT student)*

Tropical and subtropical crop production in the Eastern Cape

THE development of village committees and primary co-operatives in 50 villages continued with the focus on the organisation and functioning of the Community Development Associations (CDA). **Ms Rosemary du Preez** and collaborators presented 26 training workshops on topics including organisation, responsibilities and record keeping. Technical training on banana production was also carried out in eight villages to ensure good farming practices to produce good yields of high quality. In the Port St Johns area, farmers achieved good production with good quality mangoes and litchi fruits produced which were sold directly to the local Spar group. In collaboration with **Ms Karen de Jager**, an



Soap-making training in Dedeni village, Eastern Cape. Members of local communities produce soap for own use and marketing to earn an income

initial soap making workshop was held with the Dedeni group and basic equipment and soap moulds were provided. Hluleka, Xurana and Ngobozana are expanding their soap making and are currently marketing soaps within the village and to local guesthouses.

The agro-processing development in the villages currently allows for niche marketing. The challenge is to increase production in the villages to ensure the agro-processing groups produce sufficient products as demand grows. ■



Production training on a wide range of tropical and subtropical crops is carried out to ensure that farmers carry out the correct practices for good yield and quality

INDIGENOUS PLANTS

*KEI-APPLE (*Dovyalis caffra*)*

In a collaborative study, **Dr Elliasha Hajari** and **Ms Dzunisani Nonyane** are working with **Ms Rosemary du Preez** and **Karen de Jager** to investigate the genetic relationships amongst Kei-apple selections. The Kei-apple is an indigenous fruit that has a high vitamin C content and has good agro-processing potential for the production of jams, marmalades, dried fruit rolls, etc. Preliminary results suggest a tentative relationship between genetic components and juice characteristics. ■



Collaboration with Thulani Primary School, Nkhuhlu

THE relationship between Thulani Primary School and the ARC-TSC began a couple of years ago with a collaborative relationship between SANParks (Kruger National Park) and the ARC-TSC, to supply Kei-apple (*Dovyalis caffra*) trees to provide an indigenous fruit tree with agro-processing potential as a means for the school to generate income. A further spin-off is the introduction of the importance of trees to



Thulani Primary School educators and community members admiring the growth of the Kei-apple trees on the school grounds



the environment to young primary school learners. The educators and learners are committed and the trees are well looked after and many can now be top-worked with good agro-processing selections. Discussions with the educators as well as community members indicated a need for training in product development such as jams and juices as well as the potential for other activities at the school in the future. The school and local community is also a partner in a collaborative project proposal involving **Mrs Rosemary du Preez, Ms Karen de Jager, Mr Oscar Maphanga, Mr Moses Molope, Dr Elli Hajari and Dr Karin Hannweg** focussing on the development of Kei-apple. ■

Mr Oscar Maphanga explaining the importance of tree training and pruning

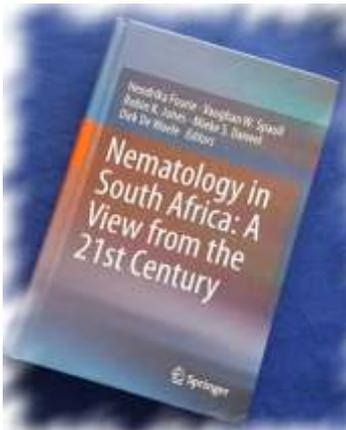
AWARDS

DR Karin Hannweg received the Award of Appreciation from SANParks on 26 May 2017. This was for her involvement in the Warburgia Team's commitment and unfailing determination to succeed in the propagation of the endangered Pepperbark Tree. This is a collaborative project between the ARC-TSC, SANBI, SAPPI and SANParks. ■



DR Mieke Daneel and co-writers received the Bayer Crop Science Award for Advancement in Nematology for their new book: *Nematology in South Africa: A view from the 21st century*. The award was presented at the 21st

Symposium of the Nematological Society of Southern Africa, 7-11 May 2017, Fairmont Zimbali Resort, Ballito, KwaZulu-Natal, South Africa. ■



Dr Mieke Daneel with Dr Driekie Fourie at the award presentation



Invited Speaker

SEVERAL of our colleagues (**Dr Mduduzi Ngcobo, Dr Elize Jooste and Ms Maritha Schoeman**) attended and presented at the 4th International Symposium on Postharvest Pathology, 29 - 31 May 2017 at Skukuza, Kruger National Park. Dr Ngcobo was an invited speaker on the topic: Optimised packaging, cold chain management and containerisation using air modelling. Dr Ngcobo also chaired the session on Post-Harvest Disease Control. ■



Meet our NEW POST-DOCS

DR Nomali Ngobese joined the ARC as a Postdoctoral Research Fellow in the Agro-processing division in May 2017. She is an Applied Plant Scientist with specialisation in Food Processing. Nomali completed her doctoral studies at the University of KwaZulu-Natal: she obtained a master's degree in Plant Biology and thereafter was trained in the Agricultural Engineering discipline in applying the principles of food science to process plant food products for a PhD. Her current work focuses on characterising the seeds of indigenous plant species, for use as alternative sources in acquiring ingredients for commercial food production on Post-Harvest Disease Control. ■



Dr Nomali Ngobese

DR Rebogile Mphahlele is a former post-doctoral fellow of Stellenbosch University. She participated in an internship program as an assistant researcher at PPECB focusing on postharvest handling of horticultural crops such as table grapes and citrus. Dr Mphahlele obtained her PhD (Horticulture) under the SARChi chair, Stellenbosch University. She was appointed as a research fellow at ARC-TSC on 1 March 2017. ■



Dr Rebogile Mphahlele



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