Dear Colleagues!

We asked for a FUNKY name in the first newsletter.

Suggestions received:

- Fruitopia
- Fruity-Bits
- Fruitos
- Fructo
- Nelfructo
- Fruta
- Fruity-Tuity
- Fruitful

Now we need you to vote for a name. Send your vote to Karin or Elli on or before 28 February 2017 via e-mail.
CONFERENCES, SYMPOSIA & RESEARCH DAYS

IPUF 2016 - Port St Johns

DRS Tertia Grove, Karin Hannweg, Wokadala, Ms Karen de Jager, Rosemary du Preez, Phumzile Ndlovu and Mr Riaan de Jager attended and presented at the 19th Annual Indigenous Plant Use Forum Conference which was held in Port St Johns, Eastern Cape. The group delivered seven Oral and poster presentations and also participated in the Indigenous Plant Use Product display. A major highlight was the conferring of the prestigious IPUF Award to Ms Rosemary du Preez and Ms Karen de Jager for their work in several villages and communities in the Eastern Cape.

We are extremely proud of their achievement!

SASAT (South African Association of Agricultural Technologists)

SASAT (South African Association of Agricultural Technologists) was established in order to advance the status and professional interests of agricultural technologists in South Africa. Amongst others, the organisation seeks to create opportunities such as conferences for agricultural technologists to network and present their research results and to recognise them for outstanding performance in their respective fields of expertise. The annual South African Association of Agricultural Technologists Conference was held in Upington, Northern Cape from 6 - 9 September 2016. Mr. Christo Human is not only an Executive Board Member, but was also Awarded the Best Oral Presentation at the Congress for his paper entitled “The effect of Kelpak on fruit set, fruit retention, yield and fruit size on three mango cultivars”. Ms Nikki Combrink was awarded 3rd place for her Poster presentation entitled: “Comparing the incidence of creasing in Palmer and Washington navel oranges”.

Congratulations!
CRI RESEARCH SYMPOSIUM

Ten research personnel and students attended and participated in the CRI Biennial Citrus Symposium held in the Drakensberg from 22 - 25 August. Drs Zelda Bijzet, Elli Hajari, Elize Jooste, Nhlanhla Mathaba, Mr Nico Roets, and students Ms Ingiphile Ngwamba, Joyce Mothapo, Rulani Shibambu and Almari van der Loo presented 6 Oral and 6 Poster papers between them across a wide range of subject areas.

The Symposium is held once every two years and showcases Citrus Research being carried out by various research organisations and Universities.

TUT RESEARCH DAY

The Faculty of Science at Tshwane University of Technology holds an annual Research Day so that their students can present their latest research findings and also obtain experience in scientific presenting. Ms Karen de Jager presented two posters on the research she is conducting towards an MTech in Food Science Technology.

She was also co-author of five other posters presented at the Research Day. Ms Rosemary du Preez was also a co-author on a student presentation.
TRAINING INITIATIVES

SCHOOLS OUTREACH: Role of biotechnology to address food security in South Africa

DRS Elli Hajari and Karin Hannweg hosted a teacher and learners from Mashishing Secondary School on 15 August. The pupils were a select group of learners that were competing in the SAASTA National Schools Debate Competition and they had qualified to represent Mpumalanga at the final round. The learners were engaged with detailed presentations covering various topics in terms of the role biotechnology can play in addressing food security in South Africa. Other colleagues who hosted the students in their labs, nursery and processing units included Dr Elize Jooste, Ms Bridget Zulu, Ms Dzuni Nonyane, Mr Gerrit Visser, Ms Tshimangadzo Malindi, Mr Oscar Maphanga, Mr Moses Molope and Ms Karen de Jager. The aim of this was to encourage the students to consider pursuing a career in science. This visit was very successful and it was also a good public relations exercise to advertise the role played by the ARC in the agricultural sector in South Africa.

DEVELOPING YOUNG SCIENTISTS

Several of our young scientists are themselves involved in the development of students keen to enter the field of horticultural/agricultural research. Drs Nhlanhla Mathaba and Mbokota Khosa regularly interact with students from North West University, University of KwaZulu-Natal, University of Limpopo and Tshwane University of Technology as mentors in the fields of pre- and post-harvest technology and nematology, respectively. New entrants into the field of horticultural science can only enhance and strengthen the position of the ARC in the field of horticultural science.
THE Agricultural Research Council, Tropical and Subtropical Crops (ARC-TSC) and the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) are currently working together to combat the fruit fly problem in Bushbuckridge and Nkomazi municipalities, Mpumalanga Province. A project was initiated with the aim of creating awareness of the fruit fly problem and especially of the new invasive fruit fly species, *Bactrocera dorsalis*. Although over 2000 farmers have attended various awareness workshops, Dr Tertia Grove’s fruit fly team which includes Mr Bongani Zulu, Ms Maria Theledi and Mr Riaan de Jager, were involved in training 909 farmers on various aspects of the control and management of fruit flies to reduce wastage of fresh fruit as well as to prevent the spread of the pests within the Municipalities during this quarter.

SHARING EXPERTISE IN TROPICAL AND SUBTROPICAL CROP PRODUCTION

ONE of the most important activities of the ARC-TSC Nursery is the sharing of expertise with farmers. Mr Oscar Maphanga and Mr Moses Molope trained a number of farmers on propagation aspects of bananas, macadamia, citrus and pecans. It is critical that farmers are aware of the importance of ensuring that their planting stock is of the highest quality to ensure that not only are their enterprises profitable, but that a quality product is produced and reaches the consumer.
DR Elli Hajari was involved in organising a workshop on Addressing Cultural and Religious Issues Surrounding Genetically Modified Organisms (GMOs). The workshop was hosted by GMASSURE. She gave a presentation on the myths and beliefs relating to GMOs. Participants at the workshop included cultural and religious leaders, i.e. chiefs from each of the provinces in South Africa, traditional healers, farmers, representatives from the Christian, Hindu and Islamic faiths, a government representative and scientists. The aim of the workshop was to dispel some of the myths and concerns surrounding GMOs using scientific evidence.

All participants gained significant insight into GMOs and it was broadly acknowledged that people in their communities do not understand what GMOs are. There was an overwhelming plea for access to information and it was apparent that there is a need for communication of information on GMOs to the public so that people can make informed decisions. There was also a request that cultural and religious leaders be represented on the GMO Executive Committee when decisions are made regarding the use of GMOs in South Africa. Participation in the workshop highlighted the role of the ARC in agricultural research and development in the country, as well as our involvement in community engagement efforts.

INDIGENOUS PLANTS

SAVING THE PEPPERBARK TREE

The SANParks Warburgia salutaris Conservation Programme seeks to address the threat of pressure on local populations that could become locally and eventually regionally extinct in the wild, with negative implications for biodiversity conservation and socio-economic wellbeing and the ARC-TSC is one of the collaborators on the project. Warburgia salutaris, or Pepperbark tree, is an important medicinal plant and is used widely to treat a number of different ailments and as a result is under threat due to overharvesting. It is highly sought-after on the traditional medicine markets and is therefore becoming an expensive product since supply does not keep up with demand. The Kruger National Park populations face increasingly intensive illegal harvesting even though they are relatively isolated from any other wild population/s and as a result there is concern for the local extinction of these populations. One of the interdisciplinary initiatives in which Dr Karin Hannweg is involved is the propagation of trees. Several thousand trees have been produced so far and these are distributed to traditional healers in neighbouring communities and associated projects.
CAPTURING YOUNG MINDS BY GREENING
THULANI PRIMARY SCHOOL, HAZYVIEW

Ms Rosemary du Preez and Karen de Jager are involved in a collaborative project with SANParks whereby kei-appel (Dovyalis caffra) seedlings were planted and established on the school grounds with the aim of harvesting the highly nutritious fruit and developing value-added products such as juice. Ms Rosemary du Preez was invited to deliver a presentation at the school’s Arbour Day tree planting ceremony and celebrations. South Africa celebrates Arbour Week in the first week of September annually. The Department of Agriculture, Forestry and Fisheries (DAFF), as the custodian of forestry in South Africa, is responsible for the campaign. National Arbour Week is an opportune time to call on all South Africans to plant indigenous trees as a practical and symbolic gesture of sustainable environmental management.

USING NATURAL ENEMIES AGAINST PLANT ALIEN INVADERS

Ms Karen de Jager and Dr Karin Hannweg met with Ms Dalene Strydom from the Mpumalanga office of the Department of Environmental Affairs. She is a biocontrol expert who focusses on the eradication of invasive plant species in our Province. Dalene also works closely with ARC-PPRI regarding the use of biocontrol agents for invader plant species control. Ms Strydom visited the ARC-TSC and released a mealy bug species on a population of moon cactus (Harissia martini) which has become established at the Nelspruit campus research farm. While the plant produces very big showy flowers at night, the arched branching stems root easily when they touch the ground facilitating rapid spread. This South American species is a Category 1b species according to the NEMBA Act (2004). It has become highly invasive as it competes with indigenous plant species. It grows readily under the crowns of trees and prevents domestic and wild animals from accessing shade. Infestations reduce the carrying capacity of the land and its spines can cause injuries to grazing animals as well as skin irritation.

A population of the invasive moon cactus, Harissia martini

Mealy bugs specific for H. martini are bred on small pieces of cactus
The plants are inoculated with a small piece of cactus infected with mealy bugs. These mealy bugs will eventually kill the cactus without infecting other plant species around them.

INTERNATIONAL NEWS ......

ISHS COUNCIL MEMBER

As the holder of the International Liaison Portfolio on the Southern African Society for Horticultural Science (SASHS) Council and South Africa’s representative on the International Society for Horticultural Science (ISHS) Council, Dr Karin Hannweg represented South Africa by attending and participating in discussions at the ISHS Joint Executive Committee and Council meetings in Quebec City, Canada from 23 - 25 August 2016. Dr Hannweg is also currently the voting member representing South Africa’s Horticultural Science interests at the meetings and is also a member of the ISHS Awards Committee as Africa’s representative.

Key highlights from the Meeting include:

- The ISHS is a highly active professional Society
- A strong Programme has been developed for IHC2018 which will be held in Istanbul, Turkey
- Acta Horticulturae remains the mainstay of the ISHS – the new streamlined submission system will ensure manuscripts are published during or just after Symposia
- Several rated Journals now form part of the ISHS stable: European Journal of Horticultural Science, Fruits (soon to be renamed Journal of Tropical and Subtropical Horticulture) and the Japanese Journal of Horticulture.
- The ISHS is aiming for inclusive continental representation on the Board to ensure that all horticultural science opportunities and challenges are addressed
- Prof Dr Rod Drew, ISHS President, was invited, and accepted the invitation to deliver the Keynote Address at Combined Congress 2017
**Avocado**

**MAKING AN IMPACT IN THE AVOCADO INDUSTRY**

Dr Elize Jooste and her team work closely with the avocado industry to ensure that the industry remains profitable and produces a quality product for which South Africa is known. The team is involved in avocado sunblotch testing, having both developed the method and providing diagnostic services to the industry. Avocado sunblotch infection can be disastrous to the industry leading to substantial decreases in both yield and fruit quality. The South African Avocado Nursery Association has now included the testing procedures in their working manual to ensure that the high standards in planting material supplied to producers are maintained. The team also carries out regular diagnostic testing for nurseries and growers.

**REDUCING THE USE OF CHEMICALS IN THE PACKING LINE TO PREVENT DISEASE DEVELOPMENT IN AVOCADO**

Dr Mieke Daneel, Mr Arthur Sippel and Ms Marinda de Beer were involved in developing a post-harvest treatment which makes use of lower concentrations of prochloraz in the avocado packing line. The MRL for prochloraz will be significantly reduced in the near future meaning that any avocado fruit to be exported needs to fall within the lower MRL limits if producers are going to maintain profitability. Although several different products were tested for their efficacy, prochloraz remained the most effective against the development of anthracnose during post-harvest storage. Several prochloraz application methods were also investigated to ensure that the product is applied effectively without compromising on quality.
WHAT CAUSES UNEVEN COLOURING IN “HASS” AVOCADO?

Dr Nhlanhla Mathaba leads a project which seeks to identify both the pre- and post-harvest factors affecting ‘Hass’ avocado skin colour change. While it is generally accepted that ‘Hass’ avocados are ripe when their skin becomes black, this change in colour can be highly variable during ripening and shipping. Exported fruit appear to arrive at their destination in various stages of maturity making them apparently less marketable. Dr Mathaba is investigating the effect of existing ripening protocols (1-MCP) on the colour development of fruit harvested throughout the season. In addition, the effect of location of production area, position of the fruit on the tree and position of the tree on the orchard slope is being investigated to determine the effects of these colour change during ripening. The results showed that 1-MCP does not affect skin colour, but does extend the fruit ripening time and that the production area had a significant effect on colour development and synchronisation. These results have enormous implications for producers wishing to export their fruit and shows how important it is that crop performance be evaluated in different climatic regions no matter the crop.

ENVIRONMENTALLY-FRIENDLY WAYS TO CONTROL COCONUT BUG ON AVOCADOS

In general, growers are dependent on pesticides to control pests in their orchards. However, not only are markets becoming stricter, and consumers becoming more aware of the negative effects of pesticides on human health, pests are becoming more and more resistant to chemical pesticides which, furthermore, negatively affect the environment. Dr Schalk Schoeman is looking at ways in which to reduce the use of chemical pesticides against coconut bug to decrease the dependency of farmers on the pesticides and to increase environmental sustainability of South African avocados. Dr Schoeman investigated various methods of controlling coconut bug including the effect of pruning on damage caused by pests as well as using the behaviour of the bug itself as a method of control. The pruned trees appeared to show far lower levels of coconut bug-induced damage than the unpruned trees, particularly near the top of the trees.

Acknowledgement: Egonya et al. 2014
SHADENET EFFECTS ON “NADORCOTT” FRUIT

Mr Nico Roets and Ms Ingiphile Ngwamba, a student currently working with Mr Roets, are currently determining whether shadenet has any effect on fruit production of ‘Nadorcott’ mandarins. This citrus cultivar has extremely high value, particularly on international markets and it is critical that growers supply the best quality fruit. Several growers are protecting their crop using shadenet but it is not known whether the shadenet cover has any beneficial or detrimental effects on fruit production and quality. The initial results of the trials indicate that the yield (ton/ha) was more than double for the uncovered orchard, compared with the covered orchard. When considering the yield of the previous season, clear alternate bearing behaviour was observed for the ‘Nadorcott’ cultivar, with the uncovered trees showing more severe alternate bearing than covered trees. At this stage it is too early to make a definite conclusion on the effect of the net on yield, because it can either negatively affect yield or reduce alternate bearing and therefore more data collection is required over time. Fruit harvested from under the net were larger, with lower concentrations of titratable acids (higher TSS:TA-ratio) however, fruit firmness, colour, rind thickness and percentage juice content were not affected by the shade nets. The effect of the shadenets on storage potential and post-harvest fruit quality is currently being investigated and the results could have enormous implications for shipping and marketing overseas.

FINE TUNING THE MOLECULAR GENOTYPE REFERENCE DATABASE FOR LEMONS AND LIMES

Dr Elli Hajari and Ms Dzuni Nonyane are working on the development of a molecular genotype reference database for cultivars and selections within the Citrus Improvement Scheme. The current project focusses on fine-tuning the existing database for lemons, limes and mandarins by investigating improved analysis methods with updated parameters in order to streamline the data analysis process. The aim of this work is to refine the database so that it may be used as a tool for the citrus industry in order to verify cultivars, determine parentage, understand phylogeny, etc. with due consideration of the constraints inherent in the system.
DEVELOPING NEW CULTIVARS BY USING CONTROLLED CITRUS POLLINATIONS

In order to fill gaps in the market or create a niche market, interesting and exciting new cultivars must be developed. This means that controlled pollinations between known male and female parents must be made to ensure that these characteristics are potentially harnessed. This year, the team comprising Mr Christo Human from Nelspruit and Ms Nikki Combrink and Mr Johan Husselman from Addo Research Station, was fortunate to have reunited with one of their retired colleagues, Mr Johan Maritz, at Addo Research Station, who assisted with this season’s pollinations. We look forward to seeing the results of these efforts!

WHAT CAUSES MACADAMIA NUT DISCOLOURATION?

DISTAL end kernel discolouration (including onion ring) can account for up to 30% of all unsound kernel when nuts are delivered at processors. It is a disorder which results in all, or part of, the basal portion of the kernel attaining a noticeable brown to black stain. Although the stain is cosmetic and does not affect taste and shelf-life it reduces marketability and therefore negatively impacts on both grower income and the of the perception of quality of this proudly South African product on the market. Soil nutrition and water status appear to play an important role in the development of discolouration and results from some of the studies carried out by Mr Mark Penter have shown that calcium applications seem to have potential for reducing the extent of discolouration and that additional work on the timing of application may improve on the results obtained. These and other studies are continuing in efforts to reduce nut discolouration.
NEW CULTIVARS FOR A RAPIDLY EXPANDING SOUTH AFRICAN MACADAMIA INDUSTRY

While it is accepted that new variety trials are needed in South Africa, there is limited information on which to base these trials. Extrapolation of relative performance data from other countries such as Australia does not yield meaningful results. Cultivars are being evaluated in different growing regions throughout South Africa to determine which cultivars are best suited for a specific area. Mr Mark Penter has established trials in three completely different climatic regions in order to determine the best cultivars for the different production areas.
MACADAMIA HUSK ROT - A POTENTIAL DISEASE OF CONCERN FOR THE SOUTH AFRICAN MACADAMIA INDUSTRY

Macadamia is one of South Africa’s top horticultural commodities. However, husk rot is becoming an increasingly important disease affecting macadamia production. Ms Maritha Schoeman is currently testing the efficacy of various fungicides for disease control during nut development. Furthermore, it appears that two Diaporthe (Phomopsis) species were identified as possible casual agents of the disease.

RESEARCH TOWARDS ENVIRONMENTALLY-FRIENDLY NUT BORER CONTROL ON MACADAMIA AND FALSE CODLING MOTH IN AVOCADO

Mr Willem Steyn is currently investigating the use of Entomopathogenic nematodes (EPNs) for the possible control of the nut borer complex on macadamias and false codling moth in avocados in South Africa. These studies could lead to the biological control of the nut borer and soil stages of false codling moth (FCM), economic pests causing substantial losses to the macadamia and avocado industries. Together with 5 other isolates, a new Steinernema species was isolated, and is currently being described in collaboration with Stellenbosch University and will be used in bioassays and field trials if it proves to be virulent against the pests. Preliminary bioassays look promising and three isolates already appear to be virulent against them.
**Litchi**

**EXPANDING THE LITCHI CULTIVAR BASE**

The South African litchi industry is largely based on a single cultivar, ‘Mauritius’. As a result, the ARC-TSC imported various litchi cultivars from Australia and Israel in order to determine the suitability of the cultivars for South African conditions. Furthermore, these cultivars are being investigated for the possibility of extending the South African litchi marketing window by at least two weeks, thereby increasing profitability. Ms Andani Mabirimisa, an MSc student in the Plant Breeding Division, used six of the imported cultivars, namely: ‘Early Delight’, ‘Fay Zee Siu’, ‘HLH Mauritius’, ‘Kaimana’, ‘Kwai May Pink’, and ‘Third Month Red’, in reciprocal crossings. The aim of this study was to evaluate the cross compatibility and applicability of the imported lines in the current breeding programme using reciprocal crosses. Even though the study is ongoing, the preliminary results indicate that ‘HLH Mauritius’ and ‘Third Month Red’ have a higher cross compatibility compared with ‘Kwai May Pink’, ‘Early Delight’, ‘Fay Zee Siu’ and ‘Kaimana’. This has important implications for the development of promising new cultivars with excellent horticultural traits.

**FRUIT FLIES**

**THOUSANDS OF FARMERS MADE AWARE OF THE INVASIVE FRUIT FLY, B. DORSALIS, AND THE IMPORTANCE OF ITS CONTROL**

Dr Tertia Grové initiated a collaborative project with the aim of creating awareness of the fruit fly problem and especially of the new invasive fruit fly species. Crop-advisers of DARDLEA in the two municipalities were trained in order to give guidance to producers. Traps for monitoring the important fruit fly species were deployed in order to determine the diversity, abundance and seasonality of species. Traps were placed in different habitats, which included cultivated, rural and residential areas and fruit infestation levels were investigated. Basic information necessary for the development of an integrated fruit fly control programme has to be obtained in order to reduce the damage caused by fruit flies. In order to alleviate the situation, an environmentally-sound area-wide management strategy needs to be developed and a good working relationship was established between the stakeholders. All staff members of the ARC-TSC involved in the project were trained. Thirty DARDLEA officers received training and in Bushbuckridge and Nkomazi, 2000 farmers attended various farmers’ association meetings and were made aware of the fruit fly problem. This will be a continuous process and after initial awareness, producers will be informed about the relative numbers of *B. dorsalis* in the various areas. During the meetings the producers asked for government support to control the fruit flies as most of them are resource-poor farmers. When *B. dorsalis* was initially detected in the areas, DAFF placed out bait stations (Bait application technique) and wooden blocks (Male annihilation technique) in an attempt to eradicate the pest in the area.
DIAGNOSTIC SERVICES

DISEASE DIAGNOSTICS

The Disease Management section carries out diagnostic testing for a variety of industries. Ms Maritha Schoeman uses robust and reliable diagnostic methods for Phytophthora and Pythium detection. It is critical that these diseases are controlled by nurseries propagating subtropical fruit crops and these diagnostic methods have resulted in a recommendation from Subtrop that all nurseries propagating subtropical fruit crops make use of the ARC-TSC laboratories for diagnostic purposes to ensure that clean, top-quality plants are distributed to growers.

FLOW CYTOMETRY

Dr Karin Hannweg and Mr Gerrit Visser carry out flow cytometric analytical services for internal and external clients. The services include ploidy analysis as well as DNA content analysis which breeders use to expand the depth of their breeding programmes. Crops include all the tropical and subtropical fruit crops, forest tree species, various indigenous plant species as well as fodder crops.
THANK YOU to all those who contributed to this SECOND ISSUE of the ARC-Tropical and Subtropical Crops Newsletter

REMINDER: Submit your vote on or before 28 February 2017.