Forestry and Agricultural Biotechnology Institute
"Future Forests and Food"

Tree Protection News

Newsletter of the Tree Protection Co-operative Programme (TPCP) and DST/NRF Centre of Excellence in Tree Health Biotechnology (CTHB)

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FROM THE DIRECTOR'S DESK

Just a few weeks ago, the FABI team attended a gala dinner to celebrate the culmination of the 17th year of the Institute's existence. This is always a special event, providing a forum to consider key events of the past year and to celebrate with awards, the outstanding achievements of many team members. From a tree health perspective, it is difficult not to recall the fact that FABI was built on a foundation laid by the Tree Protection Co-operative Programme – better known as the TPCP. It is remarkable to think that the TPCP, having reached its 25th anniversary in April this year, initially including just a "hand full" of people, could have given rise to numerous programs in FABI, many of them now having their own substantial international recognition.

While considering 'milestones" relating to Tree Health in South Africa, it is relevant to record the fact that 2014 marks the 10th Anniversary of the National Research Foundation-Department of Science and Technology Centres of Excellence Programme. The first six CoE's that emerged from a competitive (there were some 75 initial proposals) and internationally peer reviewed process were formally constituted in 2004 and this marked the start of the Centre of Excellence in Tree Health Biotechnology (CTHB) housed in FABI. The CTHB has operated in close association with the TPCP since its inauguration and today these programmes are integrally linked and very strongly dependent on each other. While the boundaries between these programmes were initially drawn to separate the health of native and non-native plantation-grown trees, these have become increasingly porous as our

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Contributions by: Mike Wingfield, Darryl Herron, Brett Hurley, Jolanda Roux,
Layout and design: Jolanda Roux

understanding of this area has grown. While some differences can be found in these areas of investigation, the overlapping areas and the synergy that they bring to each other are numerous, significant and of long term importance to forestry and forest conservation in South Africa and globally.

The recent Centres of Excellence Director's meeting held at the University of the Western Cape included a celebration of the 10th Anniversary of the CoE's programme. Minister of Science and Technology, Honorable Naledi Pandor spoke enthusiastically about the successes of the CoE funding 'instrument". She made the point that she hoped the new Centres of Excellence, most launched in the last year, will be as successful as those started 10 years back. For those of us interested in forests and forestry, it is pleasing to know that the field of tree health was one of the areas chosen for support ten years ago.

The pressures due to pests and diseases on forestry in South Africa continue to grow. If I were to briefly discuss just the most important of these, this preface to 'Tree Health News" would end up being much longer than reasonable. I am often asked whether it is insects or microbial pathogens that we should be most concerned about. And of course this is an impossible question to answer. Pests and diseases in forestry are highly dynamic in their patterns of occurrence and in the impact that they have on trees. For many years, diseases and particularly those of *Eucalyptus* were of greatest concern. More recently, insect pests seem to have emerged as more challenging. We must also consider the interactions between insects, pathogens and the environment. From a TPCP standpoint, and in our effort to promote the sustainability of commercial forestry, it is crucially important to maintain the capacity to produce relevant research, education, management tools and extension to address the breadth of these problems.

As we move towards the end of a year, perhaps the most important issue is to recognize that a huge amount of progress has been made in

New challenges every year, such as the unexpected appearance of a rust disease of black wattle in KZN. Photo: Millions of rust spores accumulating in slimy masses on *Acacia mearnsii* leaves

dealing with a large number of serious tree health problems this last year. This has been achieved through remarkable team effort. This team includes researchers at FABI, foresters, forest researchers and forest managers in the TPCP member companies, our colleagues at the ICFR, DAFF, FSA, DST, DTI, NRF and also collaborators and colleagues in institutions and universities in many parts of the world. There is no question that collaboration has become one of the most important 'driving forces" in modern day science and it will be more so in the future. Pest and disease problems are sure to grow in coming years and our capacity to deal with them and thus to ensure long term sustainability of forests and forestry will depend increasingly on team effort and collaboration, nationally and globally.

The New Year (2015) is on the horizon. The research team of the TPCP and the CTHB take this opportunity to wish you, your family and friends a happy festive season and a New Year filled with happiness and good health. We look forward to working with you and to facing the many challenges relating to our central goal of "KEEPING TREES HEALTHY".

Warm Regards, Mike Wingfield

TWO NEW POST-DOCTORAL RESEARCHERS FROM AUSTRALIA

The Australians are invading! This time at least it is not any of their "nasty" insects or pathogens, but two researchers who have joined FABI to help in the fight against pests and pathogens and our efforts to fulfil our aim of "keeping trees healthy".

Dr. Alistair McTaggart

Alistair has been working on rust fungi for the past few years, most recently completing an online key to the rust fungi of Australia (http://collections.daff.qld.gov.au/web/key/rustfungi/) as a research fellow at the University of Queensland in Brisbane, Australia. Alistair combines his passion for classical taxonomy, based on morphology, with modern molecular tools to study the systematics of fungi. He is, however, also a keen botanical systematist and knows more about South African plants than many South Africans!

For his post-doc Alistair will be working on some of the rust fungi on trees in South Africa. He has already helped us in identifying the causal agent of the rust disease of *Acacia mearnsii* in the KZN Midlands, as well as an unknown rust fungus of *Eucalyptus* found in Eastern and Southern Africa. This all during his first two months in Pretoria! Alistair brings valuable experience in working with a group of fungi of increasing importance in South Africa and will be instrumental in aligning our research to deal with these potentially devastating pathogens.

Dr. Louise Shuey

Louise obtained her PhD in 2014 from the University of Queensland in Brisbane, working on transcriptional profiling of mosaic virus defense responses in *Arabidopsis*. She also has experience in working on *Eucalyptus* pathogens such as *Quambalaria* and *Puccinia psidii*, obtained as a research assistant with DAFF's forestry section in Brisbane.

Louise joined the Eucalyptus Pine Pathogen Interactions (EPPI) research group of Dr. Sanushka Naidoo where she will focus on identifying the genetic mechanisms associated with resistance to the myrtle rust pathogen, *Puccinia psidii*, in *Eucalyptus grandis*.

WELCOME TO THE TPCP AND CTHB RESEARCH TEAMS

Dr Michelle Schroder is interested in insect ecology and insect plant interactions. During her MSc and PhD studies she investigated various aspects of aphid host plant selection behaviour with the aim to improve integrated pest management strategies to reduce incidence of aphid transmitted viruses. Michelle joined the TPCP team for her post-doc and is currently working on the *Gonipterus scutellatus* complex on Eucalyptus species in South Africa. She aim to understand the ecological and evolutionary implications of cryptic diversity in the complex with particular focus on interactions with host plants and biological control agents in South African *Eucalyptus* plantation s.

Redzuan Rauf is from Malasia, where he works as head of the forest health unit for a state government link company located in Tawau Sabah, Sabah Softwoods Berhad (Sabah Softwoods Ltd.). He joined the TPCP/CTHB research teams to undertake research for a Masters degree. The topic of his research is the disease of *Acacia mangium* caused by a *Ceratocystis* sp. and which is resulting in millions of rands of losses annually.

FAREWELL TO VIVIENNE CLARENCE

Vivienne (centre) with four of the young people who's lives she has influenced in her special way.

After 17 years of employment and dedication, is was with sadness and a heavy heart that FABIans bid farewell to Mrs Vivienne Clarence on December 10th. Having joined the FABI team at its inception, Vivienne was employed in the capacity of a Financial and Laboratory Administrator. During the more recent years she was responsible for the financial management of the CTHB and maintained over 70 cost centres within the University of Pretoria's financial structure. FABI director, Prof Mike Wingfield, described Vivienne as a moral compass and said she provided encouragement and support to the postgraduate student cohort whom she took under her wings as her own children.

Often integral in many students' degrees, Vivienne's selfless support ensured that the laboratory environment was always a productive one. It is this tenacity and caring nature that will surely be missed. Vivienne relocates to the sunny province of KwaZulu-Natal, where her daughter Dr Emma Clarence resides.

CTHB CENTRE OF EXCELLENCE CELEBRATES 10 YEARS!

Minister Pandor with members of the CTHB team at the annual CoE's Director's Forum and 10th celebration of the first centres of excellence.

The Department of Science and Technology/National Research Foundation Centre of Excellence in Tree Health Biotechnology (CTHB) at FABI was one of the first six CoE's to be selected for funding by the South African Government. A gala dinner celebration and Director's of the CoE's programme was held on the 12th and 13th of November to mark the 10th Anniversary of the launch of the CoE's programme and the initiation of a programme, which is widely regarded as having had a substantial impact on the "Science System" in South Africa and mentioned in the November 2014 issue of Nature.

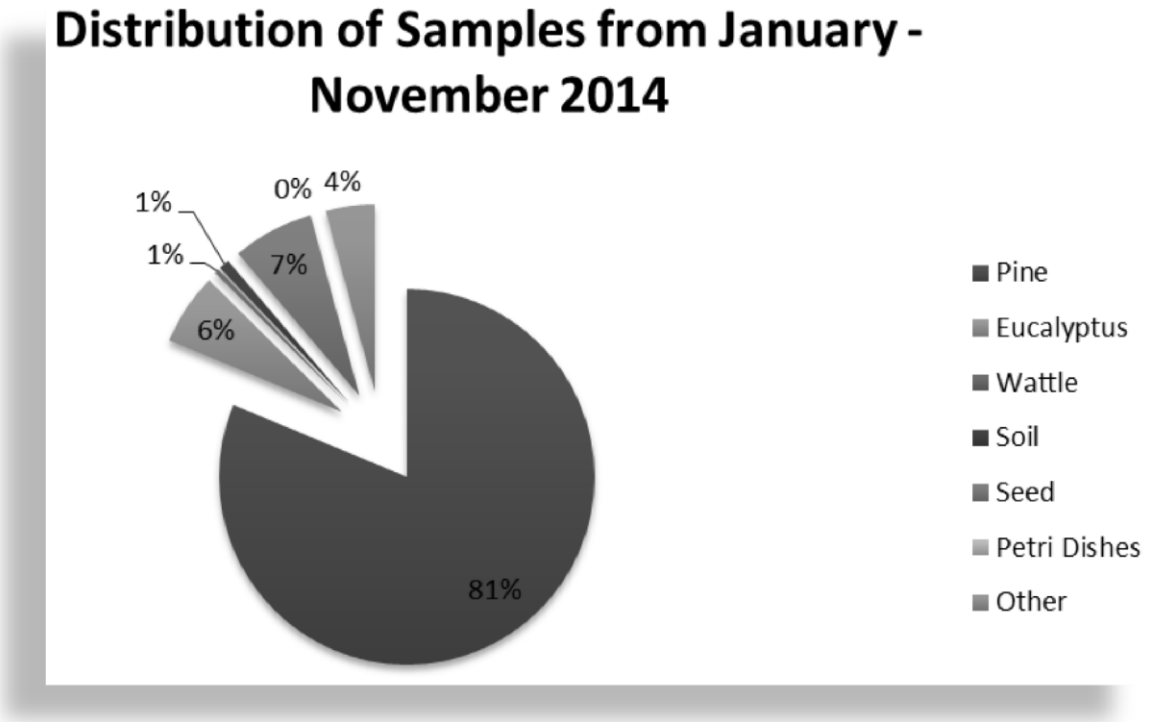
The CoE' Director's Forum was opened by Honorable Minister Naledi Pandor who praised the accomplishments of the first CoE's and expressed her strong enthusiasm for this "funding instrument" of the DST. She also took the opportunity to welcome the new Centre's of excellence (now 15 in number) and especially the five that were awarded in 2014.

The CTHB participation in the CoE Director's Forum included Profs Mike Wingfield (Director) and Emma Steenkamp (Deputy Director), Heidi Fysh (Programme Manager), Mr. Mike Edwards (CTHB Board Member) and students Janneke Aylward (University of Stellenbosh "node" of the CTHB) and Juanita Avontuur (FABI). The event included two major Panel Discussions: one on "Strategies for strengthening international collaborations and partnerships" catalyzed with a lecture by Mike Wingfield.

The CTHB focuses its research on the health of native South African trees, engaging students from a wide array of different disciplines and capitalizing on opportunities linked to the "intersections" between these disciplines. Close engagement with the Forestry Industry of South Africa has brought substantial leverage of funding for both the industry and the CoE. This links closely to the fact that pest and disease problems reflect many porous boundaries between planted forests and natural woody ecosystems. As is true for all the initial CoE's, the CTHB has substantially uplifted post graduate student education (strongly focused on students from disadvantaged backgrounds), community engagement projects, support for various Government initiatives and broad scientific output.

DIAGNOSTIC CLINIC

The role pests and pathogens play in shaping the world's future is becoming more apparent, more now than ever. We no longer have the protection of our oceans, mountains or great distances. The globalization innovation has made our world so much smaller and that means we need to adapt. That is why the TPCP/CTHB Diagnostic Clinic is an essential part of tree protection; you could say we, along with many others, are on the front lines of that battle. The Diagnostic Clinic has all the necessary resources and draws information from a wealth of knowledge generated by both the TPCP and CTHB research programmes, and international collaborators.



Looking back at some statistics for 2014, from January to November the TPCP/CTHB Diagnostic Clinic received and processed over 1400 samples. Of these 81% consisted of pine, 6% eucalyptus, and 0.4% wattle, while seed, soil and other (water, stick traps and other non-forestry crops) samples made up the remaining 12.5%. The most common samples received were those submitted for routine *Fusarium circinatum* testing, water testing, insect identification and wattle rust confirmation. Some of the interesting non-forestry crops spread amongst the forestry samples included Tree ferns, Tree lucern, White Stinkwood, Cypress, Macadamia, Orchid, Honey daisy and Marula, to name a few.

These types of samples, most often, come from private home owners and forms part of our community services.

I wish you all a wonderful festive season and a happy new year. I look forward to 2015 and to building an even stronger working relationship with all of you. I want to thank the members of the clinic for all their help and guidance this year. We certainly could not do what we do without the combined efforts of everyone – thank you Prof. Jolanda Roux, Miss Izette Greyling, Miss Simone Fouché, Mr DongHyeon Lee and Mr Tanay Bose for all of your valued assistance.

Darryl Herron, Clinic Manager

SAPPI EXECUTIVES VISIT FABI

Sappi executives and TPCP/CTHB team members visiting the insectarium on the UP Experimental Farm.

The forestry research team (including members of the TPCP, CTHB and the Forest Molecular Genetics (FMG) programme enjoyed the pleasure of a visit by Sappi senior executives on Friday 21st November. The visitors included Mr Steve Binnie (Sappi Group CEO), Mr Alex Thiel (CEO Sappi South Africa), Dr Terry Stanger (Managing Director, Sappi Forests) and Dr Charlie Clarke (Manager Sappi Technology Centre). The primary purpose of this visit was for Sappi top management to gain exposure to the multiplicity of forestry activities (tree disease research and extension, biological control of forestry pests, molecular genetics of forest trees and chemical engineering) that they support and from which the company benefits, at the University of Pretoria. The group visited various FABI facilities, the highlight of which was the FABI Biological Control Centre, to which Sappi has recently made a substantial financial investment for expansion. Opportunities to accentuate "connections" between FABI and other University activities and those linked to the Sappi Technology Centre on the Innovation Hub were also explored.

NOT ONE, BUT TWO NRF A-RATED SCIENTISTS IN FABI!

During the annual awards ceremony of the National Research Foundation (NRF), two research leaders in FABI were honoured. This event provided the stage to recognise top research accomplishment in South Africa through the presentation of awards to new recipients of NRF "P" and "A" ratings. Prof. Brenda Wingfield received an "A" rating for the first time in 2014 and Prof. Mike Wingfield received his fourth "A" rating in 2013, having now held this status for 18 years. Mike was not available to receive his award in 2013 and thus found himself sharing the stage with Brenda at this years event. They are in the most unusual position of being one of only two couples to share this highest status for scientists at South African research institutions. The "A" rating is awarded to "Researchers who are unequivocally recognised by their peers as leading international scholars in their field for the high quality and impact of their recent research outputs."

Prof. Brenda and Mike Wingfield, two of South Africa's leading researchers.

IUFRO WORLD CONGRESS USA 2014

The 24th World Congress of the International Union of Forest Research Organizations (IUFRO) took place in Salt Lake City, USA in October 2014. Approximately 3000 delegates attended the meeting, with 1200 oral presentations and 1200 posters. The TPCP/CTHB research team was represented by seven delegates, but several more ex-Fabians and collaborators were also in attendance.

A highlight of the congress for South Africans included the official appointment of Prof. Mike Wingfield, the director of FABI, as the new IUFRO president. Additionally, Prof. Jolanda Roux received one of the IUFRO Scientific Achievement awards. Both Mike and Jolanda subsequently featured in Youtube and local television interviews to highlight the importance of forestry research.

CTHB/TPCP research was showcased as scientific talks and as posters during the congress. Mike Wingfield presented a plenary talk on the impacts of trading in live plant material on current and future pest and pathogen outbreaks, and the massive problem it is for managing forest health globally. This is because when there is no control of moving plant matter, pest and pathogen outbreaks would inherently lack predictive power, the consequence of which could be damning to a forest operation. Prof. Bernard Slippers spoke about fungal endophytes and how they move around undetected and in a second presentation shared research on the Sirex-Amylostereum research at FABI. Jolanda presented work of PhD student Luke Jimu on seed-borne pathogens in *Eucalyptus* and chaired a session on the impacts and monitoring of pest and pathogens in a changing world. Dr. Jeff Garnas discussed the importance of having a good understanding of the population dynamics of invasive forest pests in space and time, using the example of Gonipterus on Eucalyptus in South Africa and Dr. Brett Hurley spoke about biocontrol of *Leptocybe invasa* in South African plantations.

Mike Wingfield being congratulated by outgoing IUFRO president, Dr. Niels Ehlers Koch.

Mike Wingfield helping to plant an American chestnut during a tree planting ceremony prior to the start of the congress.

Brett Hurley presenting a talk on FABI's *Leptocybe* biological control programme.

SPRING GRADUATION
2 CTHB/TPCP PHDs AND 4 MSCs GRADUATE

The Spring Graduation Ceremony of the Faculty of Natural and Agricultural Science took place on Thursday 4 September. The CTHB and TPCP teams were as usual well represented and we congratulate these two team members on receiving their PhDs and four on receiving their MSc degrees!

PhD

Dr. Michael Mbenoun – Diversity, ecology and taxonomy of tree infecting *Ceratocystis* species in Africa.
Dr. Divine Shyntum – Characterising the Type VI secretions system in *Pantoea ananatis*.

CTHB and TPCP graduandi and their supervisors after the spring graduation

MSc

Marike Du Plessis Palmer (*Cum Laude*) - Phylo- and comparative genomics of the *Pantoea* core genome.
Arista Fourie (*Cum Laude*) - Distinguishing between cryptic species in the *Ceratocystis fimbriata sensu lato* species complex.
Tracy Godlonton - Mating locus structure and a gene duplication in *Ceratocystis* species.
Mkhululi Maphosa – Identification of unique genes in the genome of *Fusarium circinatum* and the development of a robust diagnostic technique using these sequences.
Amy Wooding (*Cum Laude*) - Sex determination and symbiont transmission in the *Sirex-Amylostereum* mutualism.

WHO'S WHO IN THE CTHB & TPCP PROGRAMMES

Omotayo Adenigba

Ph.D. student
Nationality: Nigerian
Research/Expertise: My Ph.D. study is on the role of fungal peptide pheromones in *Fusarium* species belonging to the *Gibberella fujikuroi* complex (GFC), especially *Fusarium circinatum*, which is a very important pathogen of pine species worldwide. Fungal peptide pheromones are small molecules known to initiate sexual attraction between haploid individuals of opposite mating types within species of many fungi, but only model species have shown us the possible effects of these pheromones. My project has two overall aims. The first is to determine the exact function(s) of the pheromone genes in GFC using a functional genomics approach combined with standard genetic and microbiology methodologies. The second aim is to determine the effect of the pheromones on the biology of important species in the GFC.
Hobbies/Interests: I enjoy reading, travelling and playing tennis

Helen Doman

Administrative staff
Nationality: South African

Research/Expertise: I am one of three ladies working in the front office of Fabulous FABI. My duties involve keeping Prof. Mike Wingfield on the go! I arrange for his flights, shuttles and sometimes his accommodation. In addition, I am involved in the daily administration at FABI such as arranging accommodation, flights and shuttles for our national and international visitors. I am also a part of the organising committee that arranges the annual TPCP/CTHB meeting. Furthermore, I assist students and personnel of FABI to obtain advances and process claims associated with field trips, congresses and other work related costs. I have been working at FABI since May 1999 and enjoy every minute of everyday.
Hobbies/Interests: Gardening

PEST ALERT!
OPHELIMUS MASKELLI DETECTED IN SOUTH AFRICA

In May this year symptoms of a previously unreported insect pest was detected on *Eucalyptus* in Midrand, Gauteng. While the symptoms appeared similar to those of some *Ophelimus* species, no gall formers emerged in captivity until recently. The species name must still be confirmed, but the symptoms and adults that have now emerged indicate that it might indeed be *Ophelimus maskelli*, which is a known pest of *Eucalyptus* in the Middle East, Europe, North Africa, Mauritius and New Zealand (native to Australia).

Ophelimus maskelli (Hymenoptera: Eulophidae) is a little studied insect and limited information is available regarding its taxonomy and biology. Work done in Israel showed that *Eucalyptus camaldulensis*, *E. grandis*, *E. saligna* and *E. tereticornis* are suitable hosts for the wasp, with *E. camaldulensis* especially favoured in susceptibility studies. Heavy infestations results in premature leaf drop and total defoliation of trees. In Israel up to three generations of wasp can emerge per year.

The collections of infected leaves from Midrand originally only resulted in the emergence of *Closterocerus chamaeleon*, a known larval parasitoid wasp of *O. maskelli*. Furthermore, a Tetrastichinae wasp (still to be identified) has also emerged from the galls, which is also thought to be a parasitoid of the gall former.

Work by the TPCP is ongoing to confirm the identity of this new pest, understand the threat it poses to Eucalyptus forestry, and investigate possible responses, including biological control. It is important to obtain information on the spread and host association of this new pest outside Midrand. **Thus, please notify Brett Hurley (brett.hurley@fabi.up.ac.za) should you notice the symptoms and signs of this insect on *Eucalyptus*.**

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