

FROM THE DIRECTOR'S DESK



Larvae of the cossid moth, *Coryphodema tristis*, which is causing significant damage to *Eucalyptus nitens* trees in Mpumalanga. This insect has most likely spread from native trees to infect plantation grown non-native Eucalypts in South Africa and is one of the key research focus points of the TPCP/CTHB programmes.



Damage caused by the gall wasp, *Leptocybe invasa*, in Uganda. This Australian wasp is spreading rapidly in South Africa. With the new quarantine facilities at FABI, research into the development of biological control for this pest is possible in South Africa.

Just a few weeks ago, the tree health team at FABI received the news that the DST/NRF Centre of Excellence in Tree Health Biotechnology (CTHB) would be upgraded to full Centre of Excellence status. This was welcome news, coming six years after the first six CoE's were identified by the South African Government. Of these first six CoE's four were considered fully funded and two, the CTHB and the CoE based at the Percy Fitzpatrick Institute and the University of Cape Town, were half funded. This has resulted in substantial challenges for the CTHB in meeting its service level agreement and in being able to engage with scientists representing biological disciplines not covered by the team at FABI. The CTHB now has full funding and will seek to transfer funds via bursaries and running costs to students in other institutions in South Africa that wish to work on projects linked to the health of native trees. Areas that might be covered are those linked to the impact of fire, drought, climate change and bark harvesting on native tree health. This expansion in the scope of the CTHB will bring substantially greater insight into the health of trees, and it will also build human capacity in the broader field of forestry.

While the CTHB deals exclusively with the health of native trees, the research that is conducted is strongly synergistic with the activities and interests of the Tree Protection Co-operative Programme (TPCP).

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Studies by TPCP and CTHB core team members in recent years have shown that many pest and pathogen problems negatively impacting on plantation forestry have their origins on native trees. Biological control agents for some of the most important forest insect pests might be expected to emerge from the native environment and there is substantial overlap regarding the biology of organisms that negatively impact on the health of native as well as plantation grown trees. In all respects, the expansion of the CTHB to fully funded status will represent a major boost for the future of forest health in South Africa.

As I write this introduction to the last issue of Tree Protection News for 2010, I am mindful of the fact that the marvellous new Forest Insect Biological Control facilities at FABI are very rapidly nearing completion. This world class laboratory complex will allow particularly the TPCP team to significantly ramp up its biological control efforts and especially those for *Sirex noctilio*, *Thaumastocoris peregrinus* and *Leptocybe invasa*. The team that has worked tirelessly in FABI to produce nematodes for the biological control of *Sirex* will now move to the new facilities that have been specifically designed to cater for their needs. This will also relieve the huge pressure that this activity has placed on non-*Sirex* activities in FABI. In this regard, I must take the opportunity to thank members of the FABI Team for their patience and understanding during the past three years that has enabled the TPCP to support the South African forestry industry in its fight against *Sirex*.

Pests and pathogens continue to grow in importance as they affect native and plantation forest trees. This appears to be a situation that will not change. In this regard, the emerging Forest Protection Strategy must surely define the future security of forestry in South Africa. The team that has worked to develop the draft strategy deserve praise for taking on a mammoth task and one that is yet to be completed. From the TPCP side, I must particularly thank Jolanda Roux who contributed tremendous effort to ensure that the pest and pathogen component of the strategy was appropriately compiled.

The 21st anniversary year of the TPCP has been a hectic, yet most rewarding one. The Programme has matured, gained substantial traction and security. In all respects we might say the TPCP has "come of age". We thank the South African Forestry Industry together with the TPCP Members for their vision in supporting the world's strongest single team (some 11 Ph.D.s) of tree health specialists. Equally important we thank the "grass roots" foresters and forest managers who provide the team with regular support, guidance and encouragement. And as we face the end of our 21st Birthday year, I also wish you all a very Happy Festive Season and the TPCP/CTHB team looks forward to working with you in 2010.

Kind Regards
Mike Wingfield

ANNUAL MEETING OF THE TPCP/CTHB

The annual meeting of the Tree Protection Cooperative Programme (TPCP) and DST/NRF Centre of Excellence in Tree Health Biotechnology (CTHB) will take place at the University of Pretoria on the 10th and 11th of May 2011. During this meeting students and staff of the research team at the University of Pretoria provides feed back on some of their research activities. The programme also includes a presentation by a representative from the South African Forestry industry, as well as several from international experts on tree pests and pathogens. It is an ideal time for foresters to see first hand the facilities of the TPCP/CTHB, interact with the researchers and students, as well as with foresters from other companies. As is tradition in the South African forestry community, all work and no play makes for very boring times! In light of this the evening of the 10th will comprise of a dinner at the Boston BBQ as well as the now (in)famous "hands free beer slug" competition.

If you would like to attend the meeting please contact



the TPCP board member of your company, as space is limited.

They are: Ben Pienaar (Mondi), Giovanni Sale (Sappi), Ziggi von Fintel (TWK), Colin Dyer (ICFR), Jan van der Sijde (KLF), Johan Vermaak (PG Bison), Botha Maree (Hans Merensky), Patrick Kime (NCT), Deon Malherbe (MTO), Glen Mitchell (York).

CTHB related people can contact Profs. Mike Wingfield or Emma Steenkamp



Scenes from previous annual meetings. Jolanda Roux demonstrating the hands free beer slug and attendees of the 2007 meeting take time to smile for the camera.

FUSARIUM CIRCINATUM

The first eukaryotic genome sequenced and annotated in Africa.

Fusarium circinatum (teleomorph = *Gibberella circinata*) causes the serious disease of pines known as pitch canker. The pathogen is believed to be native to Central America, possibly including the southeastern United States and the Caribbean region. *Fusarium circinatum* has caused tremendous damage to native *Pinus radiata* in California, where it first appeared in the early 1990's. Since then it has devastated pine plantation programmes in many countries where *Pinus* spp. are grown as non-natives. One example is found in South Africa where the pathogen first appeared in pine nurseries in 1990 and has come to be a major constraint to pine establishment in the country. It has also moved from the nursery environment to plantations in South Africa, and it threatens the future of pine forestry in the country.



Symptoms of pitch canker on mature pine trees.

A: Die-back of branches and

B: resinous cankers on the main stem of an infected tree.

Members of the research team of the Forestry and Agricultural Biotechnology Institute (FABI) and linked to the DST/NRF Centre of Excellence in Tree Health Biotechnology (CTHB) and the Tree Protection Co-operative Programme (TPCP) have studied various aspects of the taxonomy, biology and management of *F. circinatum* since it first appeared in South Africa. This work has developed to a point where knowledge of the genome of the pathogen has become desirable. To achieve this goal, the genome of *F. circinatum* was sequenced during the first semester of 2009 in a project led by Brenda Wingfield. Subsequently, she spent six months on sabbatical at the University of California, Davis as a guest of Ian Korf (<http://genomics.ucdavis.edu/>), where she and FABI

Ph.D. student, Quentin Santana began the annotation process. This included a visit to the laboratory of Mark Yandel at Utah State University who specializes in comparative genomics and developing computer software for open reading frame predication and annotation (<http://www.yandell-lab.org/>).

The annotation of the *F. circinatum* genome was completed during an Annotation Jamboree in Pretoria earlier this year. The jamboree took place at FABI and among others, utilized the computer laboratory of the University Bioinformatics Unit. During this event, annotators spent close to eight hours each day interrogating open reading frames (ORFs) generated from the MAKER genome annotation pipeline. The team of annotators included students and academic staff of the University of Pretoria and universities in the USA.



Genome annotators (from bottom row, left to right)

Prof. Brenda Wingfield, Mmatshapho Phasha, Chrizelle Beukes, Kershney Naidoo, Dr. Irene Barnes, René Sutherland, Simon Martin, Stefan Bam, Prof. Emma Steenkamp, Gerda Fourie, Lieschen de Vos, Melissa Simpson, Dr. Oleg Reva, Magriet van der Nest, Annie Chan, Albe van der Merwe, Prof. Fanus Venter, Alisa Postma, Dr. Martin Coetzee, Markus Wilken, Quentin Santana, Renate Zipfel, Stephanie Slinski, Prof. Mark Yandel, Darryl Herron

(Not in picture: Melanie Friend, Marija Kvas, Osmond Mlonyeni, Jan Nagel, Prof. Bernard Slippers)

CONTINUE



Mark Yandell of the Eccles Institute of Human Genetics, University of Utah assisted in the annotation jamboree. This was a special privilege as he and his team of computer scientists were responsible for developing MAKER, the genome annotation pipeline that was employed to predict the ORFs present in the *F. circinatum* genome. With assistance of his graduate student Carson Holt, Mark contributed significantly to the annotation jamboree by providing comparative analyses between the genomes of *F. circinatum*, *F. verticillioides* and other fungi for which genome data are available.

Prior to the jamboree, in January, annotators participated in a short course in genome annotation using the viewer and editor Apollo and presented by Brenda Wingfield. These annotations were completed during the jamboree in May.

Nearly 15 000 protein coding genes have now been identified from the 44 Mb genome, many having an unknown function. Furthermore, results from comparative genome analyses have revealed that some genes have been lost and others gained during the evolution of this important pine pathogen.

By the end of the jamboree, there were many red eyed and mentally exhausted annotators. It was, however, exciting to find that some of the participants had been inspired to further their careers in genomic research. However, the general consensus was that the whole event was "great fun!" A summary of some of the early data emerging from the jamboree was presented at the International Mycological Congress in Edinburgh in August 2010 and the first publication presenting these data is now in preparation. Furthermore, the genome of a second strain of *F. circinatum* is currently being sequenced and will in future be used for comparative genomic studies.

UNITING RESEARCH LABS ACROSS FABI

Prepared by: Jan Nagel and Waheed Mahomed

Photos: Kai-Anne Clews and Elsie de Meyer



Barry Christie and Waheed Mahomed blowing their Vuvuzelas

As the 2010 FIFA Soccer World Cup celebrations spread throughout South Africa, the University of Pretoria was not excluded. FABI was fully in the clutches of World Cup Fever and had been transformed into a brightly coloured Fan Park.

The normally serene FABI courtyard got spiced up with an assortment of flags, banners and vuvuzelas. The fever spread to all of FABI's labs where each was turned into one of the ten hosting stadiums. Each lab's members were assigned the task of decorating their lab befitting their World Cup Stadium. The result was that every lab was decked out in flags, soccer balls and of course the World Cup mascot, Zakumi. In fact, FABI took soccer support one step further with the wearing of FABI soccer shirts on Fridays to bolster the World Cup atmosphere.



The imposing figure of Gilbert Kamgan, volunteer at the soccer world cup

But what would a Fan Park be without a place to watch the soccer match? For the duration of the World Cup, games could be watched, projected on a big screen in the FABI boardroom. With the combination of supporters in soccer shirts,



Christina and Lerato in their yellow soccer shirts



The 2010 World Cup Logo

various countries' flags flying high in the courtyard, decorated corridors and labs and the echo of vuvuzelas from a cinema/boardroom, FABI ensured that this World Cup would not go unnoticed.



Zakumi

DEALING WITH NEW INVASIVE PESTS OF FORESTRY TREES

The *Leptocybe* gall wasp as an example

The Eucalyptus gall wasp, *Leptocybe invasa*, is the most recently introduced *Eucalyptus* pest in South Africa. Its introduction and establishment has been long anticipated, and feared, given its steady movement southwards in Africa from its original introduction in Israel. The early warning has most likely contributed to its early detection in South Africa, in Pretoria in 2007. It has steadily spread outwards from this center, and was identified from northern Kwa-Zulu Natal in late 2009. This identification was done from tiny larvae in developing galls using molecular tools developed by the TPCP.

Unlike many other current forestry pests in South Africa, there appears to be genetically based host resistance to the Eucalyptus gall wasp. For this reason, the TPCP launched a pilot project to develop tools for screening *Eucalyptus* material. This study clearly showed the dramatic differences between resistant and susceptible material. Subsequently a much larger trial has been conducted to assess the resistance in representative *Eucalyptus* material from different industry partners. Especially *E. camaldulensis* and its hybrids, and *E. nitens* hybrids appear to be highly susceptible. Some *E. grandis* clones and hybrids with this species are also susceptible. A third trial to screen still more breeding material will be conducted in the 2010-2011 season.

The introduction and dramatic damage of the Eucalyptus gall wasp in Israel, has led to a strong focus on biological control. A number of parasitoids have been successfully introduced and released there by Dr. Zvi Mendel. The TPCP continue to work closely with him to bring *L. invasa* parasitoids into quarantine in South Africa. Two batches have been successfully imported and incorporated into research programs. Furthermore, during a recent visit to Australia, Prof Stefan Naser, an extra-ordinary Professor linked to FABI and a biological control specialist, made a very exciting discovery of a parasitoid that appears to have much promise as a potential biological control agent. Now that breeding procedures have been optimized and the biology studied, specificity tests on related South African wasps are being conducted. These experiments are part of the process to apply for permission to conduct field assessments under controlled conditions.

Using an integrated approach of sanitation, resistance breeding and biological control, the potential devastation of large *Eucalyptus* plantations by *L. invasa* can be avoided. It will, however, take a continued effort for a number of years to reach a point where these control strategies can be applied in a focused manner. The continued collaboration between industry and the University of Pretoria brings this goal within reach.



Jolanda Roux examining a severely stunted *E. grandis* tree in Uganda.



Leptocybe invasa galls on the midrib and petioles of a severely infected Eucalypt plant.

PESTS THREATENING PINE TREES

Pinus species make up of over 50 % of planted non-native forestry species in South Africa, and are thus an important component of the country's forestry industry and a major contributor to its economy. One of the major threats to the continued use of *Pinus* species in South Africa is the losses incurred by insect pests. Since the introduction of pine to South Africa in the late seventeenth century, many insect pests native to South Africa have adapted to feed on pine. Furthermore, various insects which feed on pine in the tree's native range have been accidentally introduced into South Africa. The rate of introduction of these non-native insects has increased over time due to the increase in international trade and transport.

larvae of moths (caterpillars). Although defoliators seldom cause tree death, heavy infestations can result in stunted growth and predispose the tree to other pests and diseases. The major sap-suckers of pine are three introduced species of aphid. Heavy infestations result in stunted growth, and in severe cases death of trees. Various insects attack pine in its establishment phase (i.e. transplants). These include whitegrubs, termites, cutworms, grasshoppers and crickets. These insects can cause severe losses, resulting in stands needing to be replanted.



Elmé sorting through insects captured in *Sirex* traps.



Larvae of the pine emperor moth. These insects regularly cause extensive defoliation of pine trees in South Africa.

Insect pests of pine currently in South Africa can be divided into four major groups, namely: wood and bark borers; defoliators (foliage feeders); sap-suckers; and pests of establishment. Wood and bark borers include the *Sirex* woodwasp, the deodar weevil and a number of bark and ambrosia beetles. These insects use the inside of bark and / or the wood to feed on and to make a home. Damage by these insects includes under bark girdling, extensive tunnelling which weakens the tree, and / or the introduction of symbiotic fungi that weaken or kill the host. Defoliators include various species of beetle and the

There are different methods used to control forestry insect pests. These include biological control, chemical control, silvicultural control, breeding and selecting for resistance, or a combination of these methods. The control strategy used will depend on the particular insect and environment involved. Effective monitoring of forestry pests is an important factor in achieving successful control. Monitoring tools include traps, surveys, and, importantly, the involvement of foresters and farmers who are often the first to encounter pest infestations. Research in the TPCP focus specifically on identification methods, population dynamics, monitoring tools and systems, and biological control.

THE 9TH INTERNATIONAL MYCOLOGICAL CONGRESS (IMC 9)

1-6 August, Edinburgh, Scotland

The International Mycological Congress (IMC), presented by the International Mycological Association (IMA), is the largest gathering of researchers from many different affiliations and backgrounds, working with fungi. Once every four years tree pathologists, crop scientists, geneticists, medical mycologists, mushroom growers, fungal taxonomists, phylogeneticists, and many others from all over the world gather for a week and share their research ideas and results with one another. This year, the venue was the historic city of Edinburgh, capital of Scotland, and more than 1700 scientists (the greatest number ever for an IMC) from more than 80 countries attended the meeting. Among the participants were 11 Fabians and several ex-Fabians. Sounds like a holiday? Don't be mistaken! With 457 speakers to listen to and more than 1500 posters to inspect, our days were occupied from 9 am until 7 pm, with serious discussions about research continuing late into the nights.

But why do we invest our time and money in conferences such as the IMC? Firstly, to showcase our own research. In FABI, only people who present either a seminar or a poster are allowed to attend conferences, which thus serves as a forum where our research is exhibited. At the same time we are able to benchmark the quality of our work alongside that of scientists from elsewhere in the world. At this stage we are doing well! Genome sequencing for example, is presently considered state-of-the-art, and we have already sequenced the genomes of two major tree pathogens (the pitch canker pathogen and the *Ceratocystis* wilt pathogen) as well as the bacterial blight pathogen *Pantoea ananatis*, and are part of a consortium doing a third (that of the *Amylostereum areolatum* symbiont to *Sirex noctilio*).

At important international meetings such as the IMC, it is possible to learn about new technologies that can be used in our quest for healthier trees, and novel ways to analyse and interpret research results.

Listening and talking to our peers serve as a valuable incubator for fresh ideas and cross-fertilization of existing expertise.



Attendees of the IMC conference
in front of the Edinburgh International Conference Centre.

Perhaps the most valuable aspect of conferences such as the IMC is the international contacts that we are able to make and collaborations that stem from these. In many cases, the FABI research team has achieved better results and published more strongly in collaboration with colleagues from abroad, than would have been the case without this input. After meeting people in person at conferences, many of these scientists have come to visit FABI, often for extended periods of time, working with our students in the field and the laboratories. The opposite is also true of course. Conferences such as the IMC have led to many of the team being to other universities and institutes to present lectures and to undertake research. This expands our research horizons and insights further and it always builds new sources of financial and intellectual growth. The value of attending conferences such as the IMC9 cannot easily be calculated, and will most probably only be visible three to four years from now.

WHO'S WHO?

Fahimeh Jami



PhD student from Iran

Research / Expertise: My research focuses on the identification and taxonomy of Botryosphaeriaceae (endophyte fungi) on *Acacia karroo* trees in South Africa. *Acacia karroo* is native to southern Africa, is one of the dominant trees in the landscape, and forms an important part of the ecosystem. Little information is known about the fungal species that are associated with *A. karroo*, some of which could be native or introduced pathogens that could threaten the future survival of this iconic African tree. Botryosphaeriaceae are an important group of latent pathogens capable of infecting and causing disease on a wide range of hosts. My research aims to increase our understanding of the diversity of Botryosphaeriaceae fungi associated with *A. karroo* in South Africa, and identify those which are pathogenic. I have sampled from *A. karroo* across the country, which has provided me with the great opportunity to visit much of South Africa.

Hobbies / Interests: I love working in the laboratory, reading psychology, self-help and social science books, and gardening.

Marlene Harney



Technical staff from South Africa

Research / Expertise: I am part of a team that focuses on the biological control of forest insect pests. Two of our current programmes are aimed at searching for suitable parasitoid wasps to control the spread of *Leptocybe invasa* and *Thaumastocoris peregrinus*. These are both invasive pests on *Eucalyptus* trees. We are testing five different species under quarantine conditions and it is my responsibility to develop rearing programs for these parasitoids. This requires an understanding of the taxonomy, biology and living conditions of the parasitoids, as well as knowledge and expertise on rearing the insect hosts and growing plants in quarantine conditions. I am also responsible for the curation and development of an insect reference collection and the implementation and maintenance of the Insect Bionumerics Database.

Hobbies / Interests: I enjoy traveling and I find it interesting to get to know different cultures (we lived in five different countries during the past 15 years). I am an outdoor person and love camping, hiking and cycling.

FOREST PATHOLOGY NEWS FROM IUFRO

The 23rd world conference of the International Union of Forestry Research Organizations (IUFRO) took place during the last week of August 2010 in Seoul, Korea. The conference had a significant forest protection component with several sessions dealing with tree pathogens. A total of 92 countries were represented by 2675 delegates that attended the conference. This spectacular conference included 170 sessions, with 916 oral presentations and 1054 posters.



Wet field participants with dead oak tree in the background, Paju, South Korea. This oak tree was attacked by *Platypus koryoensis* and *Raffaelea quercus-mongolicae*.

After the main conference, 17 delegates participated in a three day forest health field tour. Unfortunately the main field stop, to see Korean oak wilt, coincided with heavy rain due to an approaching typhoon. Despite this, all participants, their two Korean forestry scientist hosts and a determined tour guide, braved the rain, decked out in colourful blue or white rain coats to inspect dying and dead oak trees at close quarters. Korean oak wilt, caused by *Raffaelea quercus-mongolicae* and its vector *Platypus koryoensis*, has resulted in significant losses to oak trees (*Q. mongolica* being the major host) in recent years. Statistics released by the Korean Forest Research Institute suggest that more than 200 000 trees were lost in 2009. The second stop of the field tour was to view Pine needle gall midge (*Tehcodiplosis japonensis*) damage and to see gypsy moth egg cocoons.

AWARDS - A number of awards were made to forest pathologists during the conference. Dr. Elena Paoletti, Istituto per la Protezione delle Piante, Italy, received the "IUFRO Forest Health" award. This award was also made to outgoing Division 7.02.00 (pathology) coordinator Dr. Gaston Laflamme, although he was sadly not able to attend the Congress to receive this award. Dr. Mariëka Gryzenhout, of the Forestry and Agricultural Biotechnology Institute (FABI), South Africa, received the Outstanding Doctoral Dissertation Award in IUFRO Division 7 (Tree Health) for the best doctoral thesis by a student who completed his/her degree in the past five years. Mariëka's research concerned the taxonomy of the Cryphonectriaceae and published the book Taxonomy,

phylogeny, and ecology of bark-infecting and tree killing fungi in the Cryphonectriaceae (APS Press) from her work. The best poster for a person under the age of 35 went to Takahashi Yukiko from the University of Tokyo in Japan, for her work on oak wilt.



Dr. Elena Paoletti receiving an award for her contributions to tree health from the outgoing Division 7 and incoming IUFRO vice-President, Prof. Mike Wingfield, during the business meeting of Division 7.

IUFRO BUSINESS - Prof. Mike Wingfield from the Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, South Africa and Dr. Su See Lee from the Forestry Research Institute of Malaysia were appointed as the two vice presidents of IUFRO, supporting Dr. Niels Ehlers Koch, the new IUFRO president from Denmark. Both Mike and Su See have been actively involved in the management of IUFRO for many years, first participating in its working parties, research groups and divisions. Mike and Su See will serve in their new positions for the next four years, until the next IUFRO world conference which will take place in Salt Lake City in the USA in 2014.

Anyone interested in becoming involved in IUFRO activities, or simply interested in sharing knowledge with fellow forest pathologists (jobs, publications, meetings, assistance), can join the email list server (FORPATH) now managed by IUFRO Headquarters staff in Vienna. To subscribe go to: <http://www.iufro.org/science/iufro-mailing-lists/list-management/rg-702-forpath>. This list server was initiated by Prof. Dale Bergdahl in the early 1990's, but was recently moved to the IUFRO web server. Other tree health related list servers hosted by IUFRO include FORENT (entomology - (<http://www.iufro.org/science/iufro-mailing-lists/list-management/rg-703-forent>)) and FORCLIM (Air pollution and climate change - (<http://lists.iufro.org/mailman/listinfo/rg70100-forclimair>)). These servers that bind some 1500 forest health specialists are open to all people with a serious interest in matters pertaining to forest health.

UPCOMING IUFRO TREE HEALTH MEETINGS - The various Working Parties and Research Groups within Division 7 (Forest Health) of IUFRO organize annual meetings in various places internationally. More information on these meetings can be found on the IUFRO website (<http://IUFRO.org>).

CONGRATULATIONS!!

The Tree Protection Co-operative Programme (TPCP) and DST/NRF Centre of Excellence in Tree Health Biotechnology (CTHB) strive for excellence in everything we do. It is, therefore not a surprise that a number of students and staff members associated with the programme received degrees of high quality and awards recognizing their excellence. We celebrate with them!



Prof. Bernard Slippers was awarded the British Association Medal (Silver) by the Southern African Society for the Advancement of Science (S₂A₃). This is one of the highest awards for research in South Africa and is given to a person under the age of 40 who has shown outstanding capability and achievement. Bernard has already published more than 60 papers in international journals, authored and co-authored chapters in books and been invited to present talks at several international meetings.



Mmatshepho Pasha, an M.Sc student in the TPCP programme was awarded a Mandela/Rhodes scholarship. This is one of the greatest honours that a

South African student can receive. These awards aim to build leadership excellence in Africa and allows students the opportunity to benefit from access to leadership development programmes while pursuing their chosen post-graduate degree.

Doctoral degrees (PhD)



Brett Hurley was awarded his PhD based on the research he conducted towards developing a better understanding regarding the factors influencing the control of the Sirex woodwasp in South Africa. His external examiners were Prof. EA Cameron (USA) and Dr. P de Groot (Canada).



Ryan Nadel obtained his PhD degree for the work he did on the bronze bug, *Thaumastocoris peregrinus*, with a thesis entitled "Molecular and chemical ecology of the *Eucalyptus* pest, *Thaumastocoris peregrinus*". His thesis was examined by Dr. S Lawson (Australia) and Dr. A Liebhold (USA).

CONTINUE



Bongani Maseko was awarded a PhD for his research on the root rot pathogens in the genus *Phytophthora*. The title of his dissertation was “Die-back of cold tolerant *Eucalyptus* associated with *Phytophthora* spp. in South Africa. His external examiners were Dr. S Denman (UK) and Dr. D Hüberli (Australia).



Rodrigo Ahumada was awarded a PhD degree for his thesis entitled “Determination and characterization of the causal agent of *Pinus radiata* needle blight in Chile”. His thesis was evaluated by Dr. D Hüberli (Australia) and Dr. DM Rizzo (USA).



Lorenzo Lombaard conducted research to better understand the pathogens in the genus *Calonectria* (*Cylindrocladium* spp.). These fungi are pathogens of various forestry trees, including Eucalypts and *Acacia mearnsii* in South Africa.

Masters Degrees (M.Sc)



James Mehl obtained his M.Sc degree for his investigation into the fungi associated with kiatat in South Africa. The title of his dissertation was “Fungi associated with the die-back of *Pterocarpus angolensis* (Kiaat) in South Africa.



Marija Kvas was awarded an M.Sc degree for her thesis entitled “Characterization of *Fusarium* species associated with floral malformation of *Syzygium cordatum*”.



FABI AND CTHB SPREAD SCIENCE FEVER AT NATIONAL SCIENCE WEEK

Prepared by Markus Wilken, Jan Nagel, Mmatshapho Phasha and Kerry-Anne Naidoo

Four post-graduate students from FABI participated in the National Science week in Piet Retief from 2-4 August 2010. The National Science Week, an initiative by the Department of Science and Technology (DST), endeavours to increase Science awareness among primary and secondary school students.



I caught it!
An enthusiastic youngster demonstrating to his friend how to catch an ice-cube on a string.



Markus Wilken explaining some of the scientific principles behind the experiments presented at the National Science Week

Students at FABI, with funding from the Centre of Excellence in Tree Health Biotechnology (CTHB), were among the exhibitors at the event. The representatives included Markus Wilken (PhD student), Jan Nagel, Kerry-Anne Pillay and Mmatshapho Phasha (MSc Students). Some of the attractions presented by the group included a range of exotic edible mushrooms, bacterial samples from everyday life, a mold terrarium, and samples of fungi used in FABI projects. The most popular experiments, however, were the science based magic tricks such as catching ice on a string or making paper clips float.

The main part of the FABI presentation was a 45-minute interactive demonstration. Various scientific experiments with subsequent explanations were used to encourage students to pursue a career in science. These experiments were aimed at introducing basic scientific principles to the students while being visually stimulating. The “Elephant Toothpaste” reaction proved to be the most fun. In this experiment, yeast is used to break down hydrogen peroxide into water and oxygen. Add some food colouring and liquid soap, and the result is a thick foam, resembling ice cream or umqombothi (African beer) according to the delighted students.



Dried insects and a light microscope were some of the attractions at the FABI exhibition.



Students watching another batch of Elephant toothpaste explode.

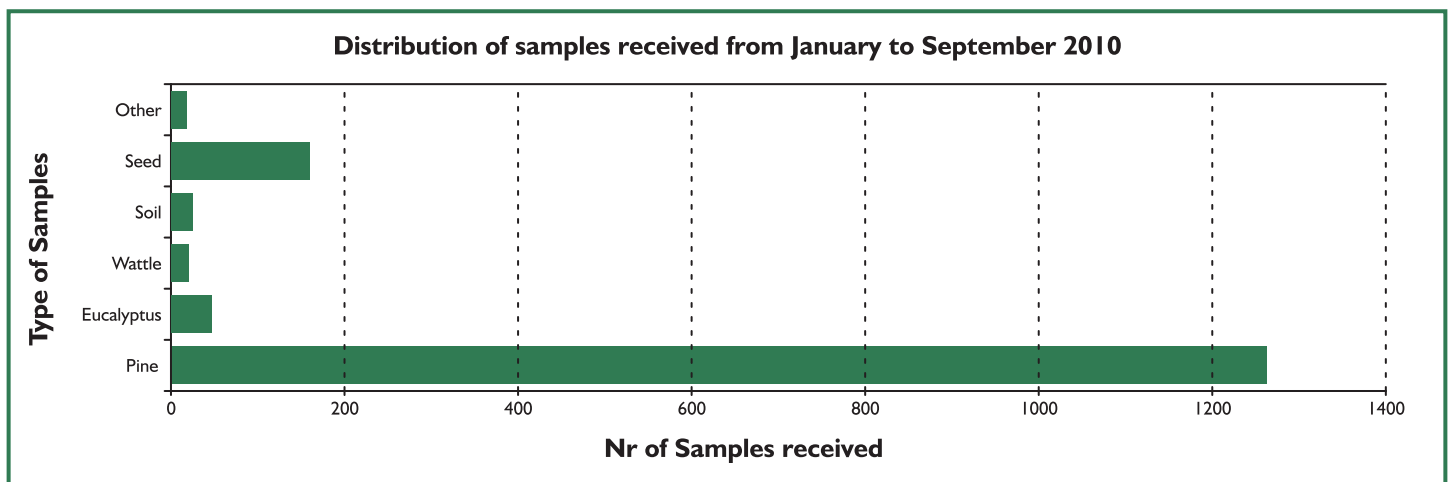
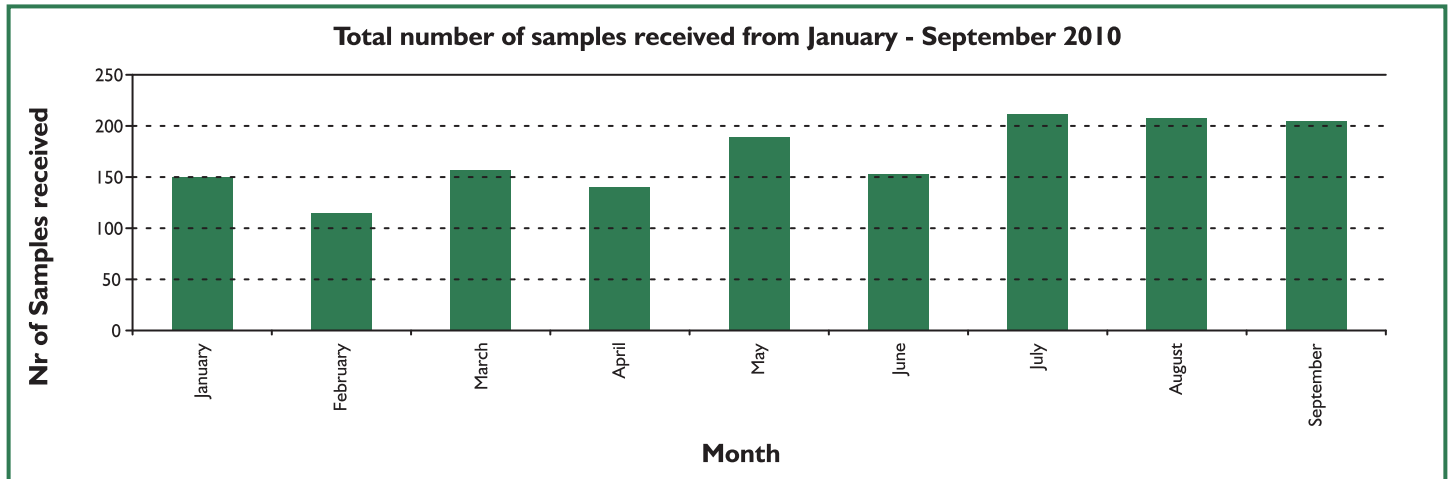
During the three days of the exhibition, a broad spectrum of students, ranging from grade 5 to 12 visited the FABI stand. A total of 1800 students representing 21 schools attended the Science week. The message from the FABI exhibition was well received and reaffirmed the importance of science to our community. Thanks to the efforts of institutions like the CTHB and FABI, the future of science in South Africa is in safe hands.

DIAGNOSTIC CLINIC AND FIELD EXTENSION

TPCP/CTHB Diagnostic Clinic 2010

The Soccer World cup year kicked off with numerous pine samples to test for the presence of the pine pitch canker pathogen, *Fusarium circinatum*. Between January and September the clinic received 1522 samples, of which the majority (83%) were *F. circinatum* related. *Fusarium circinatum* clearly continues to be the single most important pathogen of

Pines in South Africa. Many of the Pine samples received at the clinic during 2010 were either alternate pine species (as opposed to *P. patula*) or hybrids, and were often trial material. This emphasizes the concerted effort being made by tree breeders made to control and manage the pathogen and minimize its effect on the industry.



Field extension

Members of the TPCP and CTHB programmes benefit in numerous ways. Apart from providing a diagnostic clinic the teams also provides access to the most recent research findings. Through the vast network of scientists and foresters that the teams have, the South African industry also has access to the most recent experiences and advances internationally in dealing with tree health issues. The collaborative (team) model of the programmes provides substantial

synergy and support to projects that would normally have taken much longer. An important component of the TPCP and CTHB programmes is our extension activities, allowing us to share this information with foresters and farmers. The extension programme also provides a valuable back-up to the diagnostic clinic and serves as an important part of the **CONTINUE** monitoring activities of the industry.





Students and research staff of the TPCP and CTHB programmes based at the University of Pretoria has already undertaken more than 40 field visits during the first 11 months of 2010. These visits included the monitoring of pests/pathogens, visits to identify the causes of disease and pest problems experienced by members, the setting up and monitoring of research plots and the presentation of talks at field days.

We encourage all foresters/farmers to contact us if you have any disease/pest problem you would like to discuss with us, or anything that seems unusual to you.

You can contact either Izette Greyling (izette.greying@fabi.up.ac.za), Jolanda Roux (jolanda.roux@fabi.up.ac.za; 0829093202) or Brett Hurley (brett.hurley@fabi.up.ac.za) directly to set up an appointment.



TPCP students and staff with foresters.



Gilbert Kamgan Nkuekam and Linda Ndove setting up an experiment

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FEATURED PUBLICATION

UNEXPLORED OPHIOSTOMATOID FUNGAL DIVERSITY IN SA

Kamgan NG, Jacobs K, de Beer ZW, Wingfield MJ, Roux J. 2008.

Ceratocystis and *Ophiostoma* species, including three new taxa, associated with wounds on native South African trees. *Fungal Diversity* 29: 37-59.

Species in the genera *Ceratocystis* and *Ophiostoma* include important tree pathogens that typically infect wounds visited or made by their insect vectors. Well-documented examples of tree pathogens are *O. Ulmi* and *O. novo-ulmi*, responsible for the Dutch Elm disease pandemics in Europe and North America, *C. fagacearum*, a damaging wilt pathogen of *Quercus* spp. in the USA and species in the *C. fimbriata sensu lato* complex. There are also many saprotrophic species that cause blue-stain of lumber, reducing its commercial value.

Very little information is available regarding diseases of native trees in South Africa and until recently, only one pathogen, *Ceratocystis albifundus*, the cause of wattle wilt of non-native *Acacia mearnsii* trees, was known from these trees. The fungus was first reported (as *C. fimbriata*) from native *Protea* spp. in the 1970's, but was not known from diseases of native trees. In recent studies *C. albifundus*, has been found on seven native tree genera, supporting the view that the fungus is native to South Africa. This provided motivation to determine whether other ophiostomatoid fungi occur on native trees in the country.

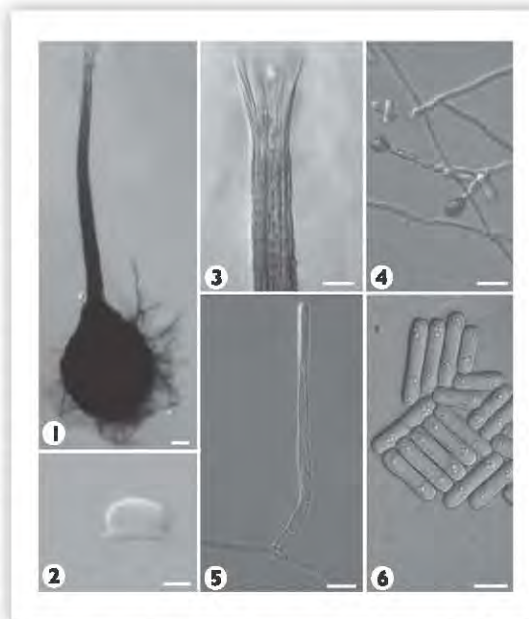
During studies up to 2008, surveys were conducted in three main areas of South Africa where native trees occur abundantly. These included the Kruger National Park (Mpumalanga Province), Leeuwfontein Collaborative Nature Reserve (Gauteng Province) and Groenkloof Forest (Tsitsikamma Forests, Western Cape Province). Wounds from which samples were collected included damage caused by elephants, kudu, eland, wind as

well as those made artificially by local traditional healers when they collect bark and wood for medicinal purposes. Fungi isolated from samples were identified using morphological studies and multigene sequence phylogeny.

Numerous *Ceratocystis* and *Ophiostoma* isolates were collected from eight native tree genera spanning six different families. These included *Acacia nigrescens* (Leguminosae), *Combretum zeyheri* (Combretaceae), *Sclerocarya birrea* (Anacardiaceae), *Burkea africana* (Leguminosae), *Faurea saligna* (Proteaceae), *Ocotea bullata* (Lauraceae), *Rapanea melanophloeos* (Myrsinaceae) and *Terminalia sericea* (Combretaceae). Five fungal species were identified from the native trees, three of which represented new species. The fungi included *C. albifundus*, *O. quercus*, and *Pesotum fragrans*. Previously unknown taxa were described as *Ceratocystis tsitsikammensis* (FIG D) (referring to the Tsitsikamma forests of South Africa), infecting *Rapanea melanophloeos* trees; *Ceratocystis savannae* (FIG E) (referring to the Savanna vegetation type where the fungus was found), infecting *Acacia nigrescens* and

Combretum zeyheri trees; *Ophiostoma longiconidiatum* (FIG F) (referring to the unusually long conidia found in the anamorph state of this fungus). Of these fungi, only *C. tsitsikammensis* appears to be capable of causing disease, resulting in serious lesions on *R. melanophloeos* trees in greenhouse inoculation trials.

Discoveries made in this study have clearly shown that the diversity of ophiostomatoid fungi infecting native trees in South Africa is poorly known. Further studies similar to this one will most likely reveal many other species, some of which could have economic and ecologic importance.



Morphology of a typical *Ceratocystis* species. (1) Sexual fruiting structure adapted for insect dispersal. Spores are produced in the round base, pushed up the long neck and then accumulate in a slimy mass at the tip of the neck from where it can easily be picked up by insects that spread it to new trees, (2-6) morphology of the spores of a *Ceratocystis* spp.

BUILDING TREE PROTECTION LINKS WITH MOZAMBIQUE

Mozambique has seen a significant increase in commercial plantation activities, using especially species of eucalypts, in recent years. However, the country does not currently have the expertise to deal with tree health problems of plantation forestry trees. Early in 2010, Silvia Mause-Sitoe, from the Eduardo Mondlane University in Maputo, joined the Forestry and Agricultural Biotechnology Institute (FABI) to undertake research towards obtaining an M.Sc in Plant Pathology, with a specialization in tree pathology. As part of her training at FABI, a survey trip was organized to plantation forestry areas in Mozambique, to obtain material for her to work on. Information obtained during this survey trip, and her subsequent research, is of importance not only to Mozambique, but also the South Africa and other neighboring countries. It is a well-established fact that pests and pathogens do not recognize man made borders and that problems that appear in one country, often rapidly spreads to another. Early knowledge of potential future threats is of significant importance for managing tree pests and diseases.

On Saturday the 3rd of July, Prof. Jolanda Roux, Silvia and fellow Fabians Marc Bouwer and Gudrun Dittrich-Shröder departed from Pretoria on a two week long survey trip of native and introduced (Eucalypt) trees in the Manica, Sofala, Zambezia and Nampula Provinces of Mozambique. Visits were made to plantations where South African companies are involved, those of private international companies and those of the Mozambican government to obtain a general idea of the current pest and disease problems in eucalypt plantations in these areas. Samples were also collected from native Myrtales (especially species of *Syzygium*), since research conducted in FABI has shown that the eucalypt stem canker pathogens, *Chrysosporthe austroafricana* and *Chr. cubensis*, may have originated from related trees in this Order.

Just under 5000km were covered during the survey trip, including fantastic newly build tarmac roads and some rather rough dirt and previously tarred roads. Some nights were spent camping, including in local villages, while on others the team was hosted by forestry companies, or stayed in local hotels (not always with hot water, but luckily temperatures in

Mozambique was much better than those in Pretoria at the time) and even with a Catholic Church! During the day they spent their time looking for diseases and pests, while at night a significant portion of their time was spent on processing the samples collected during the day.

The trip was, however, not only spent on looking for pests and diseases, but also included some fantastically beautiful scenery.

The Zambezia and Nampula Provinces of Mozambique are characterised by incredible inselbergs, jutting from the landscape. Mozambique also has a number of large rivers, including the Zambezi, and mountains in excess of 2000m high.

The team also sampled some of the locally grown tea, in Gurue, local beers and the famous Zambezi style chicken and, of course, fresh water prawns, while during the day the

staple included Mozambican bread (pao), cashew nuts and other fresh fruits and snacks.

The team returned to Pretoria on the 17th of July after what was a very successful research trip. The two weeks of survey work have generated enough laboratory work to last Silvia the rest of the year and we are sure will provide valuable information for the sustainable growth of plantation and native forests in Mozambique and its southern African neighbours. The group would like to thank all the foresters, forestry companies, Eduardo Mondlane University, Almeira Siteo and others who assisted with the logistics for the trip. Without your help it would not have been successful.



An early start from Pretoria.
Fitr Silvia, Mark, Jolanda, Gudrun



Evenings were spent isolating fungi
from the material collected during the day