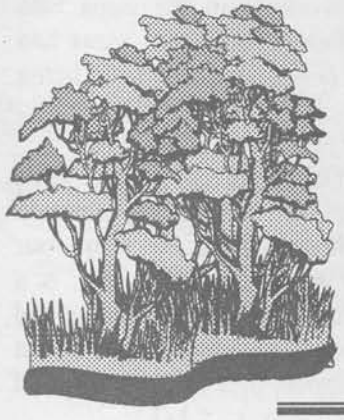


TREE PROTECTION NEWS

Newsletter of the Tree Pathology Co-operative Programme – University of Pretoria

NO 1

MAY 2001

CONTENTS

From the director's desk

Each year, the deadline for submitting the first issue of Tree Pathology News to the printers comes just after the annual meeting of the Tree Pathology Co-operative Programme. This is both a blessing and a curse. The blessing lies in the fact that the Team has just emerged from a hectic few months of preparation for the meeting and our latest findings are clearly summarised and available for discussion. The curse is that there is always a huge backlog of work after our annual meetings. Time to prepare material for this newsletter is, therefore, more limited than we would like. Nonetheless, feedback from fellow foresters and members of the TPCP regarding this newsletter is always positive and the effort is firmly worthwhile.

.....great success.

Having raised the matter of the meeting of the TPCP reminds me that this annual event deserves some discussion. As in the past, the 2001 meeting (the 11th of its kind) was a great success. This is both from the standpoint of the TEAM having an opportunity to share research findings, but perhaps more importantly, in its role as a forum for discussion and debate. These discussions are not only between TPCP researchers and members, but, importantly, also amongst representatives of member groups.

.....include a greater number of operations level foresters.

This year the TPCP meeting was attended by approximately 70 foresters, forest managers and forestry researchers. Together with the Team, and a small group of invited guests from abroad, we catered for approximately 120 people. This is a relatively large gathering, yet a size with which we are quite comfortable. I say this against the background of my comments during the meeting that I perceived a need to include in the gathering, a greater number of operations level foresters. I believe that we are failing to fully transfer research findings to the grass roots plantation level. This matter will be the subject of further debate and discussion amongst the Team and members in coming months.

I am fully aware that a relatively small sample of people from our member community is able to attend annual meetings of the TPCP. Rather than repeat many comments made at the meeting, we include a copy of the executive summary of the TPCP report in this

issue of Tree Pathology News. This document capture most key issues pertaining to the activities of the TPCP.

.....a very active disease and insect pest diagnostic service.

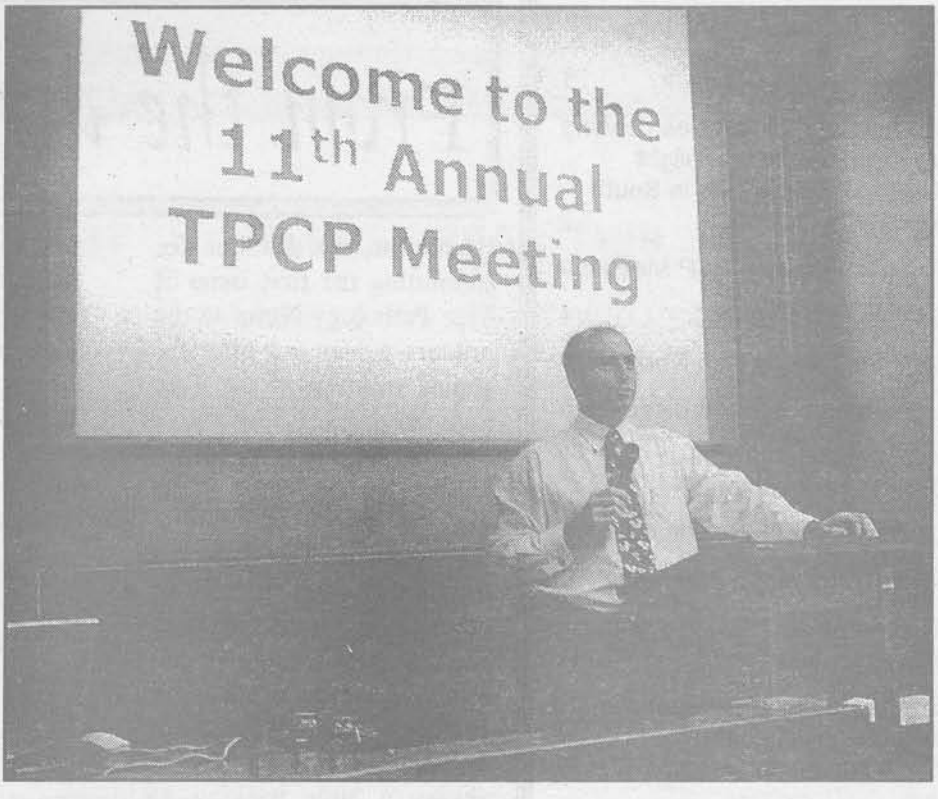
As most of you are aware, the TPCP has a very effective extension function, which also includes a very active disease and insect pest diagnostic service. During the last year we were able to spend in excess of 500 person days in plantations. This year is not likely to be any different. However, we still perceive a need to extend our reach to a greater number of field foresters. This year, we will be working hard to offer a greater number of field days for larger groups in the field. In this task, we must also call upon you to assist us in arranging these events. Within reason, these can be offered free of charge to members. All that is needed is prior planning.

...merge pathology and entomology components

During the past year, we have worked actively towards our goal of building a strong programme in forest entomology. Much progress has been made in this regard and we now have an impressive (although small) group of FABIANS working in this field. Many forest entomology issues overlap with those of pathology and we have thus begun to merge pathology and entomology components of our field extension wing and diagnostic services. Similarly, we are collectively working on insects and pathogens in our monitoring efforts. At the research level, work is somewhat more specific and has a lower level of overlap. Yet pathologists and entomologists are working in the same labs and opportunities linked to critical mass and cross hybridisation of the disciplines are being actively pursued.

The TPCP has flourished during the past year, and this has been due to two key factors. These are enthusiastic support from our members and their staff. Added to this, is a passionate group of forest pathologists and entomologists focussed on providing the best possible base of support in a unified effort of

Keeping Trees Healthy.



MYCOSPHAERELLA SPECIES CAUSING MYCOSPHAERELLA LEAF BLIGHT (MLB) ON *EUCALYPTUS* IN SOUTH AFRICA

Eucalyptus trees are grown commercially for a wide variety of uses. More than half of the South African forestry industry is based on the propagation of *Eucalyptus* species. Of the many pathogens causing disease of *Eucalyptus* trees, *Mycosphaerella* species are amongst the most important. These fungi cause a disease known as Mycosphaerella leaf blotch (MLB). In South Africa this disease is particularly damaging to *Eucalyptus nitens* where it can cause growth retardation and in severe cases tree death. The taxonomy of *Mycosphaerella* species associated with MLB in South Africa is confusing and it is still uncertain which species cause severe disease outbreaks. In this study we characterized species of *Mycosphaerella* associated with a number of MLB outbreaks. Isolates were collected from Pietermaritzburg, Umtata and Tzaneen and characterized based on pseudothecial morphology, ascospore germination and anamorph associations. A representative set of isolates was then compared based on sequence data obtained from the ITS region of the rRNA operon. Our preliminary results suggest that three species are associated with MLB outbreaks but that one species is predominant. *Mycosphaerella juvenis* was thought to be the dominant species causing MLB in South Africa. Our results, however, show that a new species is dominant in epidemic areas this therefore represents a new record for South Africa.

SASPP 2001 ABSTRACT

The 11th Annual TPCP Meeting

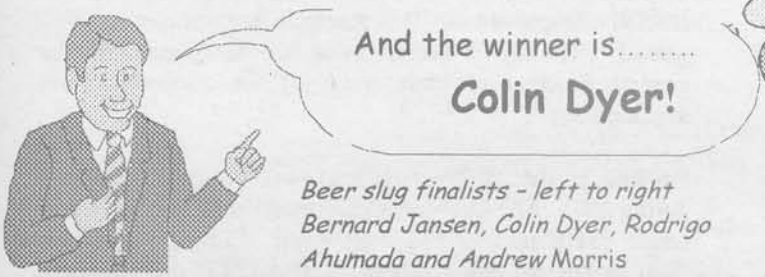
As usual the annual TPCP meeting was held in the second week of March on the 6th and the 7th. The programme was intensive with a carefully selected range of presentations to provide our members with a good overview of the activities of the TPCP during 2000.

> Excellent speakers from outside the Programme are invited to address the audience.

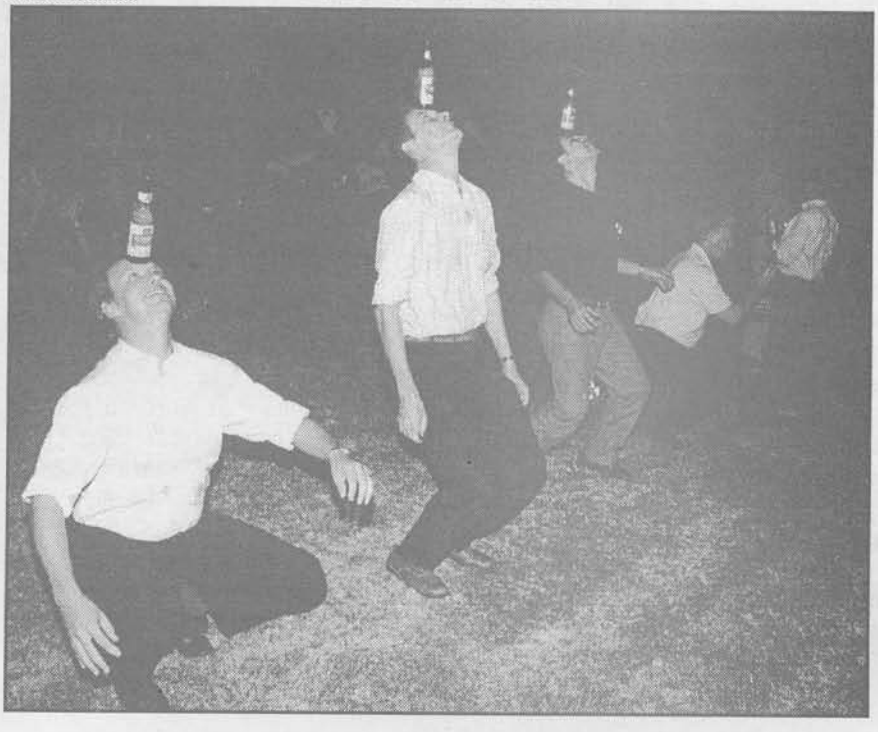
Unfortunately, not all postgraduate students were given an opportunity to present their results due to time constraints. However, aspects of pine, eucalypt and wattle tree health were covered from the pathology and to a limited extent the entomology side of the programme. The biology and ecology of major pathogens such as *Cryphonectria*, *Fusarium*, *Sphaeropsis*, *Ceratocystis*, *Phytophthora* and *Botryosphaeria* were discussed and members were updated on the latest research results pertaining to the diseases caused by these pathogens.

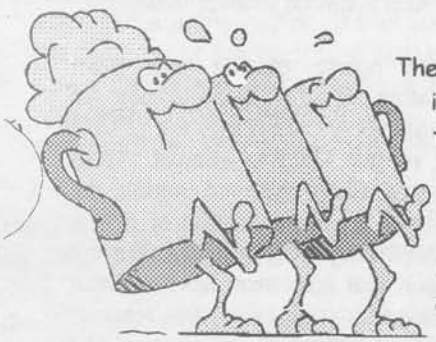
Many features of the TPCP annual meeting have become a tradition. Excellent speakers from outside the Programme are invited to address the audience. Prof. Robin Crewe (Dean of Natural and Agricultural Sciences Faculty, UP) demonstrated why the University of Pretoria has become one of the top educational institutions in our country. Following Prof. Crewe's presentation, Mr. Andrea Rossi, Managing Director of Sappi, opened the meeting by giving an overview of the changes, challenges and opportunities of the forestry industry. It was obvious from this excellent presentation that there is a wonderful future for our country and opportunities abound (there is no need to immigrate). Insightful presentations were also given by Fernando Montenegro (Fundacion Forestal, Ecuador), Dr. Ruth Frampton (Director: Forest Biosecurity, New Zealand) and Dr. Treena Burgess (Murdoch University, Australia – Treena is an ex-post-doctoral fellow of the Programme). Topics covered included sustainable forestry, forest biosecurity and the use of microsatellites in forest pathology research. Brenda Wingfield spoke about the research she conducted while on sabbatical in Australia and Dave Berger told us more about the micro-array system that the University has acquired.

Once again this year's TPCP meeting was a fantastic event. Ideas were exchanged during the presentations, at lunches and suppers and at the various meetings held during and after the event. We would like to thank everyone for their involvement in making this a truly fabulous event!



Beer slug finalists - left to right Bernard Jansen, Colin Dyer, Rodrigo Ahumada and Andrew Morris





The industry-sponsored dinner is an eleven-year-old tradition. This year we went to the Boston Barbeque who provided a buffet with an incredible number of delightful dishes. After the meal, a more recently acquired tradition was held - the beer slug. The aim of this event is to down a bottle of beer, which is balanced on your head, without using your hands. This great tradition is held annually at the Southern African Society for Plant Pathology Congress and was started by Professor John Mildenhall, a well-known plant pathologist in South Africa. Students in the group have thus had much exposure to this event and have produced legends such as Jolanda Roux, a many times national champion. Judging by the improvements in style, it is clear that the industry members had been practising for the event. In the end, Prof. Colin Dyer (Director: ICFR) was the winner - completing the exercise twice with style and grace. The TPCP group would like to take this opportunity to thank the members for a great evening!

TREE PATHOLOGY CO-OPERATIVE PROGRAMME, ANNUAL REPORT, 2000

EXECUTIVE SUMMARY

• The so-called MILLENNIUM YEAR was a bumper year for the TPCP in every possible way. The Programme entered its eleventh formal year of existence and has clearly taken its place amongst the formal structures of the South African Forestry Industry. The TPCP is uncontested in its position as the world's largest single programme dealing with diseases of plantation trees. It has also achieved significant international recognition, particularly for innovation and new knowledge pertaining to important tree pathogens.

• The transfer of the TPCP from Bloemfontein to the University of Pretoria occurred almost three years ago. The positive impact of a larger academic environment is easily seen in the growth in student numbers as well as in the quality and quantity of research outputs. The financial support and commitment of the University of Pretoria has increased continuously. This has been particularly evident and relevant where costly equipment linked to rapidly emerging new technology has been acquired without hesitation.

• During the course of the past year, negotiations relating to the incorporation of Forest Entomology activities into the general functioning of the TPCP continued. This development was first suggested during the latter part of 1997 but formalisation of a new structure has faced numerous hurdles. We are delighted to report that agreement has now been reached on this important issue, and relevant contracts will be signed at the time of the TPCP Annual Meeting in March 2001.

• Although formalisation of a funding model for the integration of Forest Entomology services had not been accomplished, the Forest Industry enabled the TPCP to begin to establish services in this crucially important field. Thus, staff and new students have been drawn to the programme, which is rapidly taking form. Challenges ahead will be to integrate current TPCP field and diagnostic services to include increasing levels of entomology.

• Studies on key diseases of plantation trees has continued as in the past. Some knew pathogens have been recognised and these have rapidly been included into the general research programme of the TPCP. One of the more important of these diseases has been a bacterial leaf blight of unknown cause. Considerable effort has been expended to identify the causal agent and this important step has now been reached. This disease will now be subjected to more intensive study.

• Most of the well recognised diseases in plantations are the subject of intensive TPCP research projects. Together with members, many diseases that have been hugely threatening are now subjected to reasonably effective management efforts, where losses have been significantly reduced. A good example is the case of Coniothyrium canker caused by *Coniothyrium zuluense*, which first appeared in South Africa in 1990. In contrast some pathogens appear to be gaining importance. Notably, the pitch canker pathogen, *Fusarium circinatum* is apparently causing increased damage. Special efforts are now underway to understand and deal with the new manifestations of the associated disease.

• A key function of the TPCP is to provide members with an effective extension service. This is achieved in a number of ways, but especially through directed funding from the Forest Owners Association for this function. The extension activities are co-ordinated by a dedicated field extension officer, who also relies on other members of the team for support. The group thus spent 560 person days in plantations conducting surveys, providing extension lectures, monitoring disease outbreaks and executing field experiments.

• Like extension services, the diagnostic clinic of the TPCP is a crucially important structure within the programme. During the past year the diagnostic clinic dealt with a significantly greater demand than in past years. The diagnostic clinic of the TPCP is widely recognised as one of the best of its kind, where information and resources crucially important to the research programme is also gained. The clinic serves as a key component of the general function of monitoring disease occurrence and development.

• Funding to the TPCP remained more or less unchanged during 2001. The University of Pretoria remains the largest single contributor to the Programme, gaining its reward from its key education function. The TPCP was fortunate to benefit from significant funding from the NRF who provide the bulk of student bursaries. Some concern is felt that this source of funding is set to reduce significantly during 2001. This can only impact negatively on the TPCP and the South African Forestry Industry. Nonetheless, the Programme was fortunate to gain an additional year of THRIP funding, although the benefit of this was somewhat reduced by payment in the last quarter of the year.

• As has always been true, the successes of the TPCP are due to a multiplicity of factors. The programme benefits from the activities of outstanding staff and students. The students in turn gain the opportunity to work on relevant problems in a dynamic industrial environment. The TPCP also owes much of its success to support from executives, managers and foresters linked to member companies. The team effort that has always been a key element of the TPCP continues unabated and all participants in this remarkable programme are thanked for their support and commitment to it.

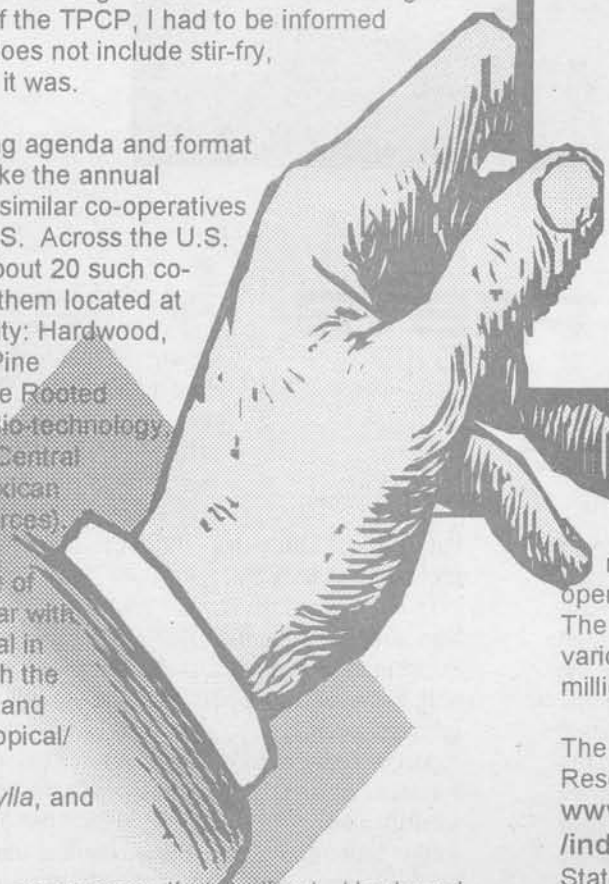
Note for "Tree Protection News"

By Dan Robison, 26 March 2001

"I have had the distinct pleasure of spending the month of March with the TPCP and FABI in Pretoria. The work you all do and/or support at TPCP/FABI is internationally recognized, and spending time here has benefited me greatly. Within an hour of arriving in Pretoria, 24 hours late due to threat of snow at home,

I was whisked away from my hotel by Marieka Venter (*Endothia/Cryphonectria* fundi) to attend the annual TPCP meeting. The meeting was excellent, with a great deal of scientific and practical management information presented. It is of course very useful to learn about forestry and pest management in ecosystems and production systems different from what I experience at home. Such exposure tends to better calibrate ones thinking, and spur creativity and purpose. There were also plenty of interesting people to speak with at the TPCP. Among the many people I spoke with, I most recall Errol Duncan, John Collins, Flic Blakeway, Arnulf Kanzler, Terry Stanger, and some others -- regrettably I cannot recall their names. We talked forestry, politics and sport – some topics with greater mutual understanding than others (sport being the most problematic, the other two about equal)! I especially enjoyed the opportunity to witness high culture in South Africa during the beer slug. Well done! And during the second evening of the TPCP, I had to be informed that a real Braai does not include stir-fry, very good though it was.

The TPCP meeting agenda and format were very much like the annual meetings held by similar co-operatives in the southern U.S. Across the U.S. south there are about 20 such co-operatives, six of them located at NC State University: Hardwood, Forest Nutrition, Pine Improvement, Pine Rooted Cuttings, Forest Bio-technology, and CAMCORE (Central American and Mexican Coniferous Resources). This last one, CAMCORE, some of you may be familiar with as it is international in scope, dealing with the discovery, testing and conservation of tropical/subtropical pines, *Eucalyptus urophylla*, and *Gmelina arborea*.



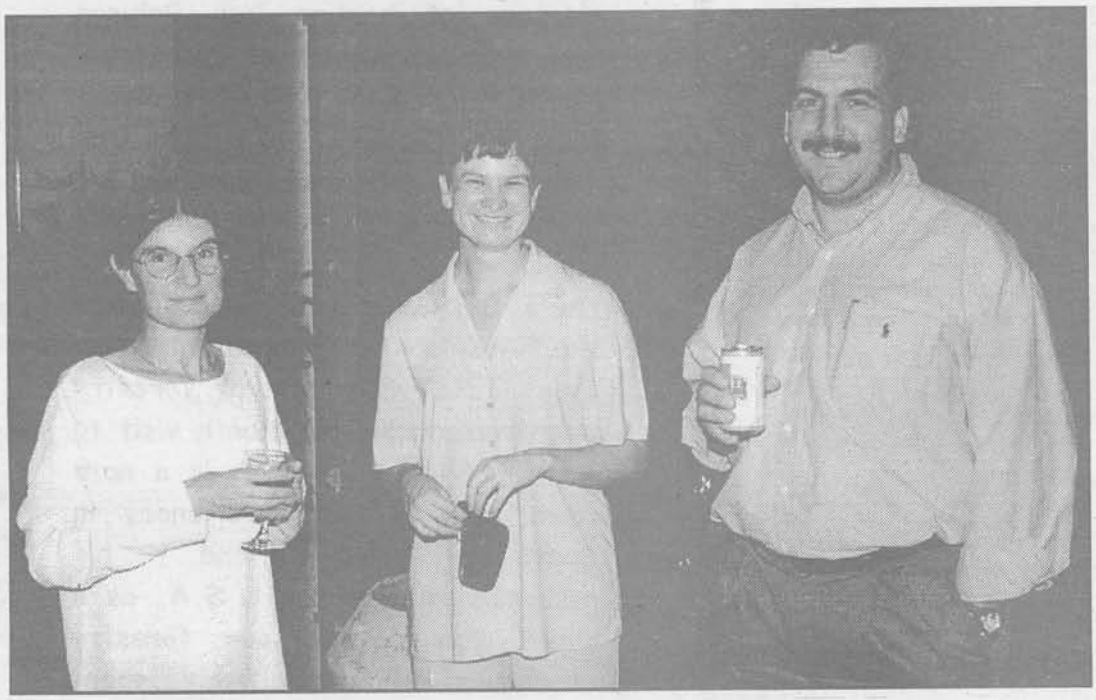
The co-operative programme that I direct, Hardwood Research, currently has 12 members with holdings across 13 states, from east Texas, north and east to Virginia. We have a very broad mandate, encompassing virtually all topics related to productivity in both natural stands and plantations. This includes genetic improvement programs for sweetgum (*Liquidambar stracyiflua*) and American sycamore (*Platanus occidentalis*), research on bacterial leaf scorch of sycamore (caused by *Xylella fastidiosa*), sweetgum tolerance/resistance to defoliation, rooted cutting work on sweetgum and red oak (*Quercus rubra*), plantation site preparation and fertilization research, wood properties, growth and yield modeling, and natural stand density and productivity dynamics. This diversity of topics in a single co-operative is due to the relative abundance of natural hardwoods across the southern U.S. (at least 30 million hectares) – justifying only a single co-operative dedicated to hardwoods in the entire region. The other 19 co-operatives deal almost entirely with various aspects of plantation pine forestry (about 12 million hectares).

In March 2001, the TPCP had the pleasure of hosting Dan Robison from the Department of Forestry - North Carolina (NC) State University (Raleigh, NC USA). Dan directs the Hardwood Research Co-operative, a university-industry-public agency partnership, much like the TPCP. Dan spent some time in the FABI labs, but importantly also spent time with several forestry industries during his month visit to South Africa. Following is a note from Dan on his experiences in South Africa and his responsibilities in the U.S.A. as a thank you to all our forestry colleagues who unselfishly spent time showing him around.

The most recent annual report from the Hardwood Research Co-operative can be found at **www2.ncsu.edu/unity/lockers/project/hardwood/index.htm.** Information on other co-operatives at NC State can be found at websites linked to the Department of Forestry or College of Natural Resources at **www.ncsu.edu.**

The week following the TPCP meeting I accompanied Mike on a flight to Richards Bay (he got me a seat with the pilots in order to better see the plantations as we landed), and spent a very good day visiting Mondi plantations (with plenty of excellent Mondi hospitality; thanks, Errol, John, Paul and Richard), along with Mike, Jolanda, and a crew of other visitors to TPCP. Then an early morning drive to Durban where I accompanied Prem Govender on visits to CSIR and Enviromentek for the Eucalypt Interest Group Meeting, and the following day to ICFR and various ICFR research sites in the Pietermaritzburg area (thanks, Colin, Colin, Janusz, and others). From Pietermaritzburg I took a little plane, and made it back to my hotel in Pretoria just 10 minutes after armed robbers had made off with their loot (fortunately none of mine, and no one was hurt). Had it not been for a highly motivated airport shuttle driver, who insisted we drive to the top of the Fort Klapperkop road for a night view of Pretoria's lights (worth a look), we would have been to the hotel just in time to be part of the crime. I had hoped to return to the Pietermaritzburg area the following week to visit with Sappi, and spend more time with Janusz, but too many other obligations called.This note is a way of saying, thank you, to everyone who helped to make my time here so interesting and worthwhile. I am hopeful that more formal collaborative work between TPCP/FABI and NC State University might be an outcome of my time here. All the best.

Danobison
Dept. of Forestry
NC State University
Raleigh, NC 27695 USA
telephone 919-515-5314, fax - 6193
dan_robison@ncsu.edu



Left to right: Dr Ruth Frampton, Marieka Venter and Dan Robison

MONITORING PESTS AND DISEASES

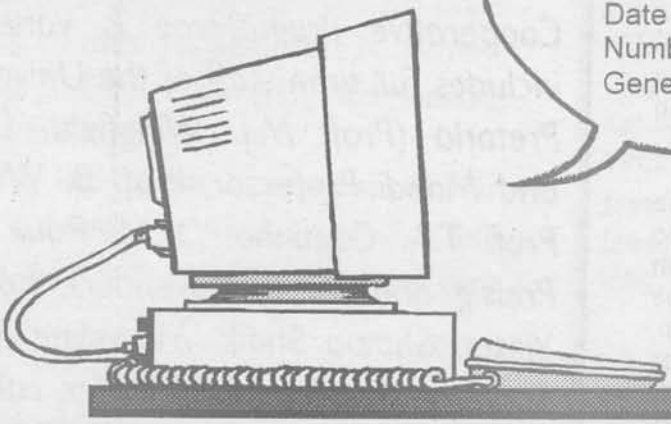
The successful control and management of pests and diseases requires a proper understanding of the causal agents, their biology and the factors that influence disease development. This knowledge includes that generated in the laboratory, and very importantly, information gathered from the field/plantation. Gathering such data requires the co-operation of EVERYONE involved in forestry, no matter how trivial you think your contribution may be. The TPCP staff and students can not spend enough time in the plantations, or cover a wide enough area on their own. We require your participation and help in accumulating as much information as possible about the occurrence of pests and diseases, the species affected, and any bit of practical information associated with the disease/pest outbreak.

We would like to request every forester and plantation manager to establish a system of pest and disease reporting in their plantation. This can be done in the form of a notice board/sheet in each office. Daily reports of disease/pest occurrences can be made on these lists and the information sent to the Pathology Extention Officer at the TPCP on a monthly/quarterly basis.

Importantly, we realise that all these reports will not always be accurate, since disease identification requires some skill. It will, however, bring possible reports under the attention of the relevant people, who can then investigate and confirm the reports. These reports must, and can be, improved by training foresters, farmers and contractors in the recognition and basic identification of diseases. Field days are of crucial importance in this training process. Please contact the TPCP with regards to field days and other training programmes in pest and disease awareness.

Information to include in pest/disease reports:

Tree species affected
Plantation, Area
Compartment number (GPS position if available)
Age of trees
Date
Number of trees affected (estimated or actual)
General symptoms and possible cause



INFORMATION CAN BE SENT TO
Jolanda Roux – Manager TPCP Field Services
Fax: 012 420 3960
Cel.: 082 372 8350
Tel: 012 420 3855
Email: jolanda.roux@fabi.up.ac.za

LOSING CONTROL WITH ALTITUDE

The history and present status of *Gonipterus scutellatus* in South Africa

On November 14th, 1916, in Newlands, Cape Town, Mr. C. J. French discovered several slug-like larvae feeding on *Eucalyptus lehmanni*. These larvae were later identified as the immature form of *Gonipterus scutellatus* - the *Eucalyptus* snout beetle. It was soon discovered that *G. scutellatus* was introduced from Australia, where they were native defoliators of *Eucalyptus*. In the absence of natural enemies, *G. scutellatus* spread rapidly and by 1929, it was found throughout the coastal areas of the western and eastern Cape, Kwazulu-Natal, east Griqualand, southern Zululand, Transkei, Mpumalanga and the north, north-eastern and north-western Free State. *G. scutellatus* caused extensive damage to a large array of *Eucalyptus* trees, with both the larval and adult forms defoliating the trees.

Various control measures (chemical and cultural) were tested, but most proved to be either unsuccessful or too costly. Entomologists searched for natural enemies in Australia, the origin of *G. scutellatus*. This resulted in the introduction of *Anaphes nitens*, an egg parasitoid wasp, in 1926, into South Africa. The introduction of *A. nitens* proved successful, except in marginal high altitude sites, where a decreased efficacy of the biological control was observed. This situation is still evident at present.

A study was undertaken in 2000, to investigate the current status of biological control of *G. scutellatus*, along an altitudinal and corresponding mean monthly minimum temperature gradient. One year old *Eucalyptus dunnii* trees, were selected from various sites and surveyed throughout the year. The growth and damage to trees, the population density of *G. scutellatus* and the percentage parasitism of *G. scutellatus* egg capsules were measured.

The percentage parasitism peaked in early summer, dropped significantly (a rather unexpected result), then increased again in late summer and decreased to a lower average over the winter months. High altitude sites and especially sites that received late spring rains, experienced an extended period of lower parasitism during the winter to spring period. Past research stated that low percentage parasitism during cold temperatures resulted from the low availability of *G. scutellatus* egg capsules during that period. However, no significant correlation between egg capsules and percentage parasitism was observed in our study.

Results from this study raise various questions. Could it be that the low winter temperatures had a direct effect on *A. nitens*? Do we need to import a cold tolerant parasitoid? Why does percentage parasitism decrease so dramatically in mid-summer? Is there genetic variability of *G. scutellatus* and *A. nitens* across an altitude range? If so, has there been several introductions of *Gonipterus* into South Africa? Are they all the same species? What are our options with future biocontrol agents? As these questions are answered, we will move closer to obtaining successful control of *G. scutellatus*, and so prevent us from 'losing control with altitude'.

THE RESEARCH TEAM OF THE TREE PATHOLOGY CO-OPERATIVE PROGRAMME

The research team of the Tree Pathology Cooperative Programme is varied. It includes full time staff of the University of Pretoria (Prof. M.J. Wingfield, Director and Mondi Professor, Prof. B. Wingfield, Prof. T.A. Coutinho, Dr. J. Roux Dr. O Preisig and Mr P. Govender), Rosemary Visser, Shazia Shaik, Marveline Molema Sonja de Beer and Eva Muller, colleagues and students attached to other organisations such as the ICFR, technical assistants funded by the University or through membership fees and post graduate students who are mainly funded by the NRF. Staff from various Departments in the University obviously provide advice and support where this is required.

Whitegrubs with a difference

A variety of soil pests affect the successful establishment of forest seedlings. The time and money wasted with consolidation operations and replanting of such stands is considerable. The insect pests responsible for this damage include whitegrubs, cutworms, termites, bark beetles and grasshoppers, to list but a few. The damage caused by whitegrubs causes substantial losses when they feed on the roots and root collar of establishing seedlings. Furthermore, the adults defoliate young and established trees, reducing growth potential. Additionally, their combined feeding facilitates secondary microbial infections through the damaged plant cuticle.

To implement optimum chemical and biological control of whitegrubs, the first step is to correctly identify the species causing the damage.

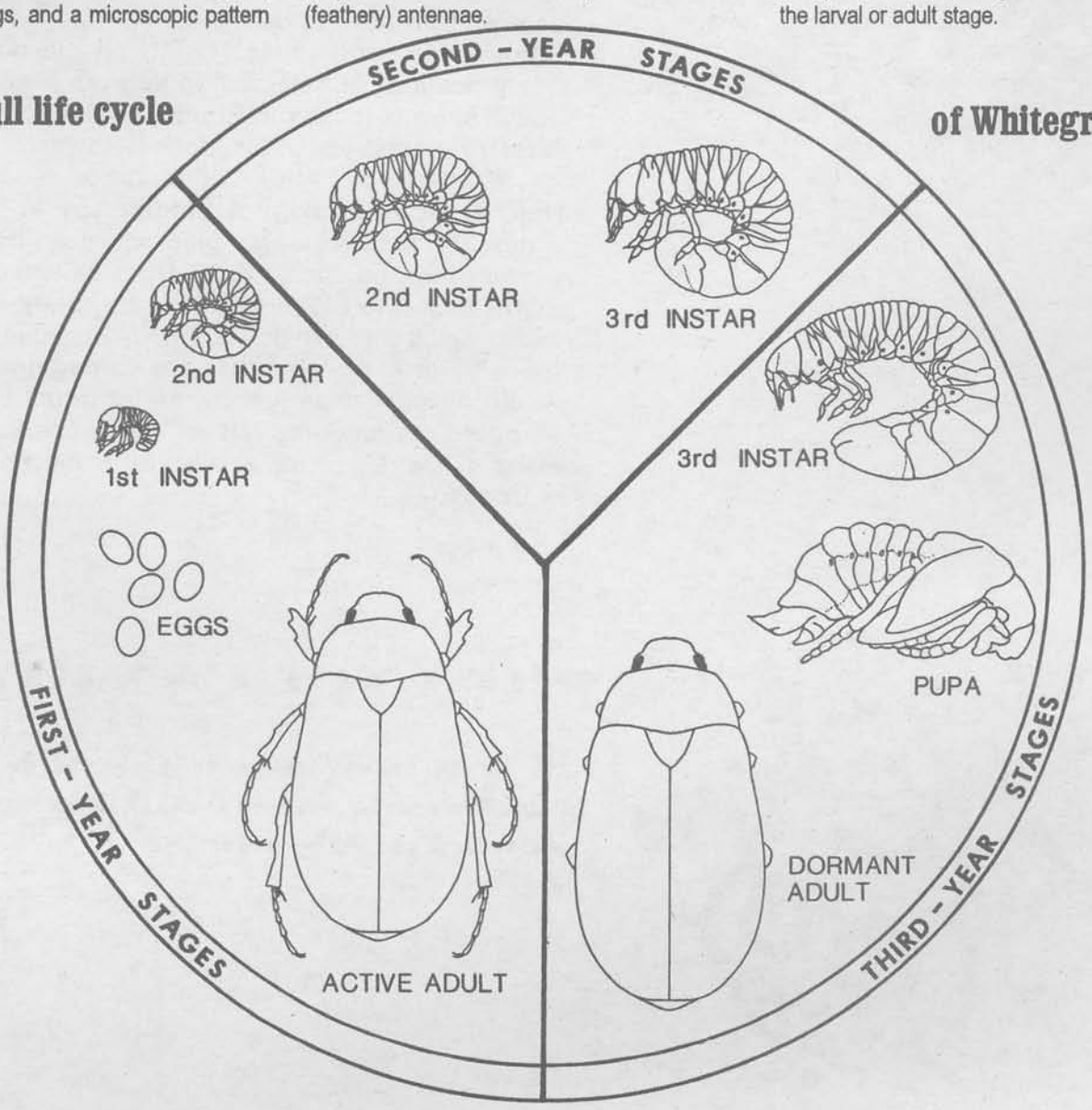
There are many different species of whitegrubs causing damage in South Africa. For example, eleven have been collected from wattle and eucalypt plantations in the Natal Midlands alone. However, when one considers that these are endemic whitegrub species, i.e. natives which have evolved to feed on a variety of plants including *Acacia*, their shift to, and abundance on, exotic plantation trees is not that surprising. The Natal Midland whitegrubs includes species from three different subfamilies (i.e. as different as pines are to eucalyptus and wattles) and consequently these whitegrub species have different life spans, feeding depths, and tolerance to chemicals. Thus, if one knows what species is present the appropriate chemical control can be applied at the right depth, and at the right time of the year ensuring optimal control of the pest.

But what are whitegrubs?

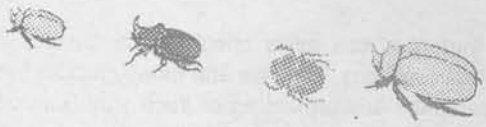
They are the larval stages of plant eating scarab beetles from five subfamilies of Scarabaeidae, i.e. Melolonthinae, Rutelinae, Dynastinae, Cetoniinae and Aphodiinae. Whitegrubs are readily identified by their 'C-shaped' body, thickened brown head capsule, three pairs of legs, and a microscopic pattern of hairs (i.e. the rastal pattern) on the end of the abdomen. The adults are more variable but are commonly known as Christmas beetles, leaf or flower chafers and generally have an ovoid body shape, brown to black body and lamellate (feathery) antennae.

Their life cycle includes an egg, three larval instars (stages) and pupa, which emerge into the adult beetle (see life cycle below). The large wattle chafer, *Hypopholis sommeri*, is a forestry pest in both life stages (grub and adult), while other whitegrubs are only pests in the larval or adult stage.

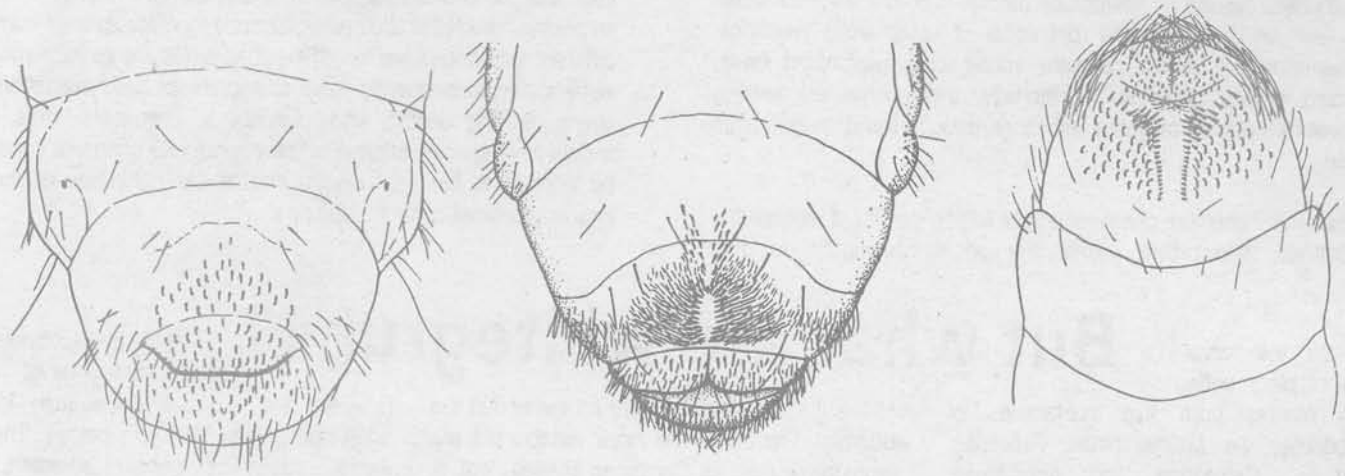
The full life cycle of Whitegrubs



To differentiate between whitegrub species entomologists routinely use the grub's rastal patterns for diagnosis. These patterns are as specific to whitegrub species, as fingerprints are to individual humans. The rastal patterns of some common forestry whitegrubs are illustrated below, note the differences in the patterns. What makes rastal patterns so useful is that they can easily be seen using an X10-20 hand lens, and are generally unambiguous. However, every rule of thumb has its exceptions, and in whitegrubs there are closely related species that have very similar patterns. Here we need to use other morphological characters or DNA techniques to separate the whitegrub species.



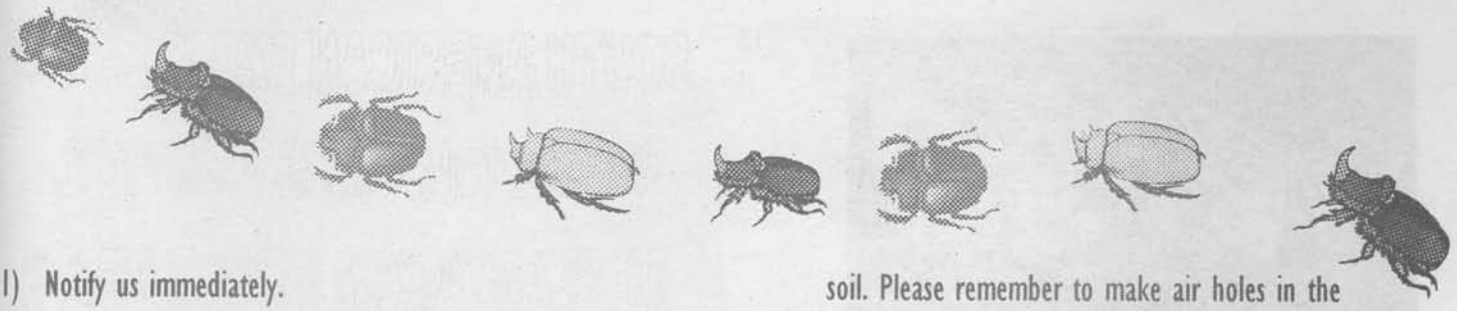
Rastal patterns can easily be seen using an X10-20 hand lens



James Harrison is working within the Forest Entomology Programme (TPCP) on the taxonomy (identification) of selected whitegrub species that cause serious losses in South African commercial forestry plantations. This work is towards a Ph.D. in Entomology, in collaboration with the Department of Zoology & Entomology at Tukkies. Although fieldwork is planned for collecting whitegrubs and their adults from selected areas, YOUR help and EXPERIENCE will greatly facilitate this project, and provide a VALUABLE overview of the whitegrub species that are damaging trees in South Africa. Consequently, an introduction to the standard procedures used to preserve these insects for both molecular and morphological work follows.

HOW YOU CAN HELP!

If you have a whitegrub outbreak we would be very grateful if you:



1) Notify us immediately.
2) Collect a representative sample of the pest involved.
3) Send the specimens to the TPCP diagnostic clinic using the preservation techniques mentioned below. Whitegrub kits are available from the diagnostic clinic. These kits include plastic vials containing absolute alcohol, information sheets, and sachets of vermiculite.
4) Remember to include as much information with the samples as possible, e.g. tree species involved, date and place collected, GPS co-ordinates, your name and other relevant information.

Adult and larval preservation:

i) Collect samples of 10-20 adult beetles or 5-10 whitegrubs per species, remembering that more than one species may be causing the damage (preferably include mating pairs for adults if possible). Place 2-5 specimens into the vials of absolute alcohol (96%) (these specimens will be used for DNA work).

ii) Courier living adult samples in a container with air holes. Live grubs should be placed in a container with slightly moist vermiculite (included in WG kit) or moist soil. Please remember to make air holes in the container.

iii) Freeze adult specimens to kill them, then air dry or preserve in 70% alcohol before shipment. These specimens will be used for morphological work.

iv) Immerse whitegrubs in boiled water (90 to 95°C), preferably using a plastic container to prevent cuticle burn, this fixes the protein by denaturing it, after about three minutes preserve grubs in 70% alcohol. Vodka, Gin, Tequila, Cane or Methylated spirits will also work if no other preservative is available, but these must first be tested to ensure their quality.

Please refer to the TPCP pamphlet "Submission of samples for disease/pest diagnosis "for additional information, and submit your whitegrub samples to the TPCP diagnostic clinic or mail James.Harrison@fabi.up.ac.za, or phone James at:

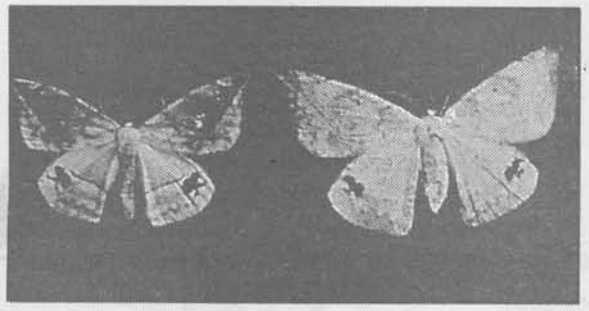
082-692-0584 and 012-420-3852.

TAXONOMY AND PHYLOGENY OF *BOTRYOSPHAERIA* SPP.

Nearly two hundred *Botryosphaeria* species occur on a wide range of woody hosts, worldwide. Many of these species are well known to cause pre- and post-harvest diseases on fruit and forest trees or their produce. Despite much research, there is still much confusion surrounding the taxonomy and phylogeny of *Botryosphaeria* spp. This has a serious impact on breeding for resistance and the implementation of other control measures for diseases associated with these fungi. In this study, the relationships between various *Botryosphaeria* spp., including the type species *B. dothidea*, were re-evaluated using sequence data from rDNA and B-tubulin regions. These data were also used to develop a rapid identification technique for *Botryosphaeria* spp. Results obtained showed clearly that isolates normally identified as *B. dothidea,* belong to at least two distinct groups. Various other *Botryosphaeria* spp. from different hosts and continents appear to represent the same taxon. Our data also show that the *Botryosphaeria* anamorph, *Fusicoccum luteum*, occurs much more widely and plays a more important role in causing disease on fruit and forest trees than was previously thought.

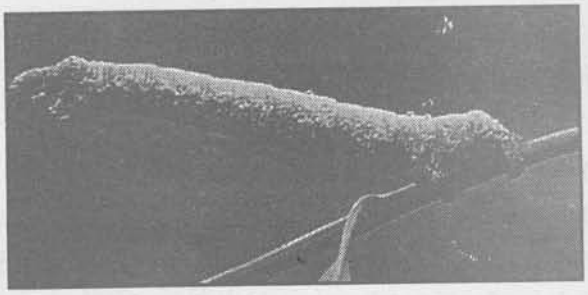
This study provides an important step towards clarifying the taxonomy and improving control strategies for *Botryosphaeria* spp.

SASPP 2001 ABSTRACT



SOUTH AMERICAN EXPERIENCES WITH BIOLOGICAL CONTROL OF PLANTATION INSECT PESTS

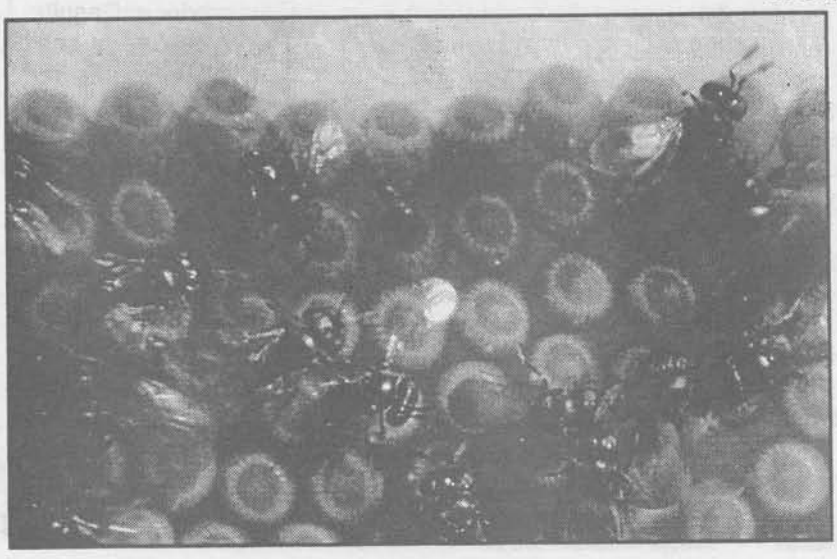
In January this year two South American researchers joined the TPCP to work towards their masters degrees in forest pathology. **Carlos Rodas** is an entomologist working for Smurfit Carton de Colombia in Colombia and **Rodrigo Ahumada** is the manager of a research programme for Arauco forestry company in Chile. Both have extensive experience in plantation forestry and plantation health, specifically with entomological problems. Both also have a long collaboration with Mike Wingfield and are considered to be old friends of the TPCP. They will be regular sights in and around FABI and the South African forestry plantations in the next two years. As an introduction to these two new TPCP members we have included a very small sample of the work that they are involved with in Colombia and Chile. Both also serve to illustrate the great success of biological control systems that are implemented correctly and with sufficient awareness amongst ALL forestry personnel.

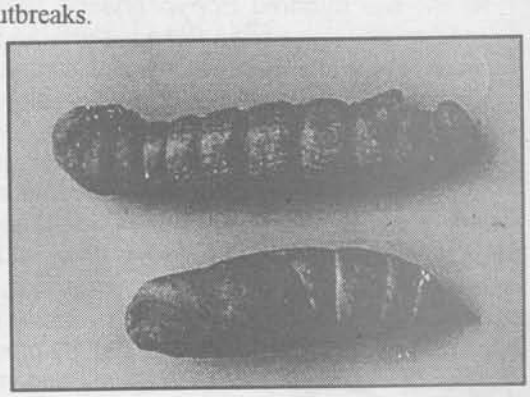


THE USE OF BIOLOGICAL CONTROL TO MANAGE PLANTATION PESTS IN COLOMBIA

The most important group of insects attacking forestry plantations in Colombia are the defoliating insects including *Oxydia trychiata*, *Chrysomima semillutearia*, *Cargolia arana* and *Glena bisulca* (Lep.: Geometridae). Annually, these insects cause large scale defoliation to pines, eucalypts and cypress in Colombia.

The use of chemical products in forestry plantations has been severely restricted for technical, economic and environmental reasons. An integrated pest management programme has, therefore, been developed for Colombia. This programme relies strongly on the early detection of pest outbreaks and the biological control of pests by using their natural enemies as parasites. For this, even the person responsible for weeding and pruning operations have been trained to recognise and report pests during their day to day activities. Currently, Smurfit Carton de Colombia has 40 000 ha of commercial pine and eucalypts plantations under biological control of several insect pests. Up to 2001 less than 0.5% losses have been reported due to pest damage of plantations. One of the most successful parasitoids have been *Telenomus alsophilae* which was successfully introduced into Colombia from the U.S.A to control *Oxydia trychiata* and other defoliator outbreaks.





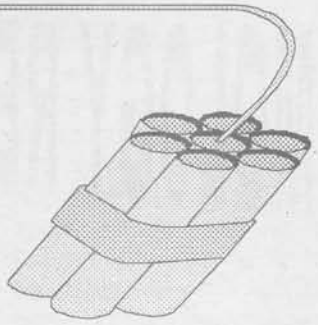
Top 4 photos: different stages of one of the pine defoliators

Left: *Telenomus parasiting* eggs of pine defoliators

Explosive news

.... the source of all news

www.up.ac.za/academic/fabi/tpc

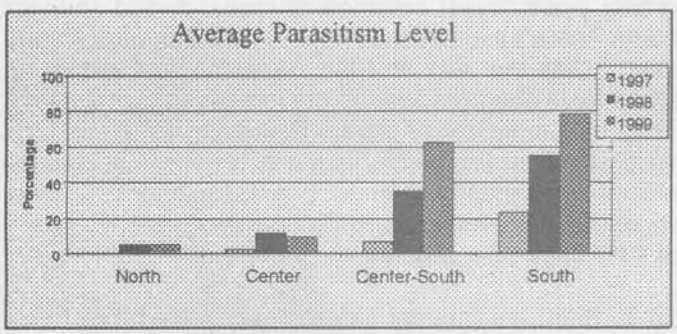


VISIT OUR WEBSITE!

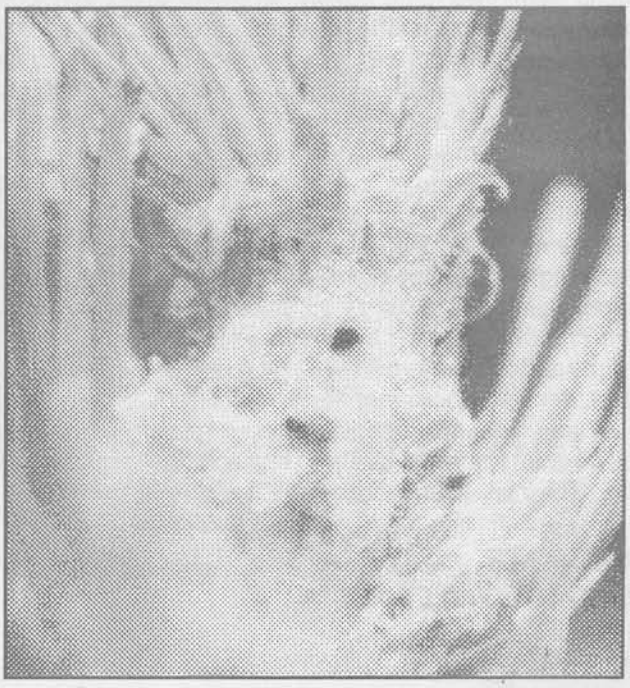
PHYTOSANITARY PROTECTION OF PLANTATIONS IN CHILE

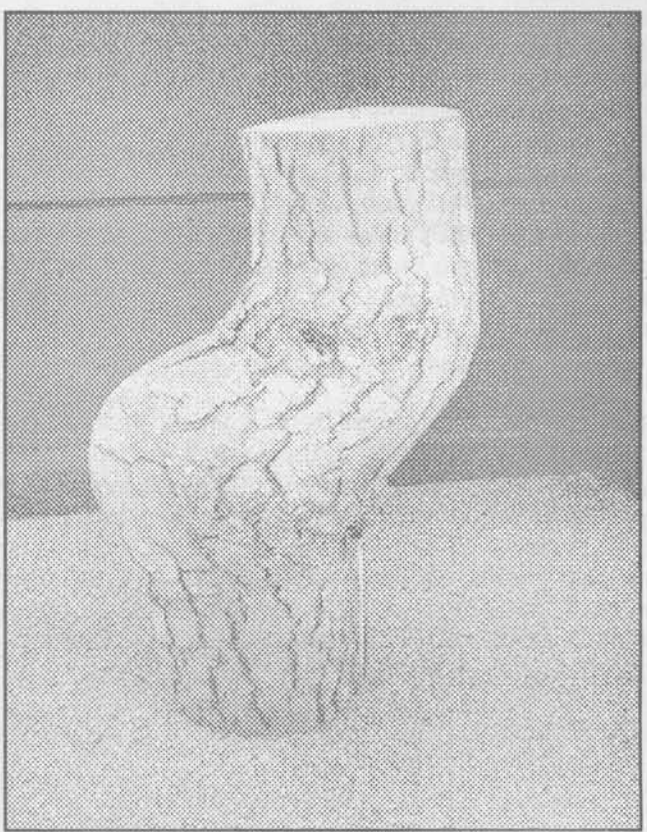
One of the most serious pests of plantation pine species is the pine shoot moth (*Rhyacionia buoliana*). Fortunately for South Africa we do not have this problem, but in Chile it results in large scale losses to pine plantations. The characteristic symptoms is the presence of resin in the shoots (Photo 1), chlorosis of the shoot tip and needles and tip die-back. When the attack is in the main shoot, some trees can recover but the majority will be deformed (Photo 2).

Great success has been achieved in Chile with the biological control of the pine shoot moth. Both a native (*Coccygomimus fuscipes*) and an introduced parasite (*Orgilus obscurator*) have been used in the fight against the shoot moth. Ten years from the first introduction of the exotic parasite from Europe it is possible to find parasitism levels of up to 80%.



While Carlos and Rodrigo have come to South Africa and the TPCP to learn pathology, it is clear that we will be learning a great deal from them. Already they have become actively involved, not only in the pathology side, but also with the new entomology programme at the TPCP. This will clearly be an advantageous collaboration for both continents. Welcome to the TPCP and South Africa.





FOREST ENTOMOLOGY RESEARCH IN SOUTH AFRICA

INTRODUCTION

Since their first establishment in South Africa, plantations of pine, eucalypts and wattle have been severely damaged by insect pests. Early in plantation development, native insects such as defoliating Lepidoptera [*Chaliopsis junodi* (wattle bagworm), *Imbrasia cytherea* (pine emperor moth), *Euproctis terminalis* (pine brown tail moth) and *Pachypasa capensis* (pine lappet moth)] have imparted significant loss and have necessitated expensive insecticidal applications. Fortunately, only a relatively small number of the potential pests of locally grown exotic trees have been accidentally introduced. But many of these have resulted in serious problems. For example, the early arrival of the Eucalypt snout beetle (*Gonipterus scutellatus*) caused sufficiently serious damage to prompt the initiation of one of the earliest programmes for biological control of a forest pest. Many other introduced pests such as the black pine aphid (*Cinara cronartii*), the pine wooly aphid (*Pineus boerneri*), the root feeding bark beetle (*Hylastes angustatus*), the eucalypt borers (*Phorocantha semipunctata, Phoracantha recurva*) and the very recently introduced pine wood wasp (*Sirex noctilio*) have a serious impact on South African forestry. They are likely to continue to do so in the future.

APPROXIMATE DATES OF DISCOVERY OF IMPORTANT INSECT PESTS

Name	Year
Phoracantha semipunctata (phoracantha beetles)	1906
Gonipterus scutellatus (eucalypt snout beetle)	1916
Hylastes angustatus (pine bark beetle)	1930
Hylotrupes bajulus (pine longhorn beetle)	1935
Pissodes nemorensis (pine weevil)	1942
Orthotomicus erosus (European bark beetle)	1968
Cinara cronartii (black pine aphid)	1974
Pineus boerneri (pine woolly aphid)	1978
Eulachnus rileyi (pine needle aphid)	1980
Trachymela tincticolis (eucalypt tortoise beetle)	1982
Cinara cupressi (cypress aphid)	1992
Sirex noctilio (pine wood wasp)	1993

A large number of extremely serious insect pests of pine, eucalypts and wattle occur on these trees in their areas of origin. It would be naïve to believe that these pests can be prevented from entering South Africa in the future. There is good evidence to show that there has been a gradually increasing number of new forest pests and pathogens entering South Africa. This is despite efforts to prevent accidental introductions through quarantine. Quarantine failures in the future will occur due to:

- Significant increases in the movement of people and products into South Africa.
- The fact that other countries in Africa, particularly those south of the Sahara have less efficient quarantine systems than those in South Africa (the so-called "weakest link" concept).

The recent accidental introduction of two of the most serious pests of trees into countries with outstanding quarantine illustrates this point. One of these pests, the Asian longhorn beetle appeared in North America for the first time just three years ago, and the costs and impact associated with this introduction are already shocking. Likewise, the appearance of one of the most serious pests, the insect borne pine wood nematode in Portugal during the latter part of 1999, is already raising significant concerns for the future of native pines throughout Europe. Strategies to contain this introduction are being implemented, but based on past experience, there is little hope that eradication will be successful.

While every effort must be made to exclude forest pests and pathogens from entering South Africa, strategies to minimise losses once introductions occur, must be a critically important component of the long-term security of our forestry industry. Failure to recognise this will unquestionably lead to the downfall of the local forestry industry.

THE PREVIOUS STATUS OF FOREST ENTOMOLOGY

In recent years, forest entomology research and services in South Africa have become fragmented and substantially eroded. Until the end of 1998, research and extension services have been provided to the forestry industry via the Institute for Commercial Forestry Research (ICFR) and the Plant Protection Research Institute (PPRI). A smaller research component linked to the association of insect pests and pathogens, has also been maintained within the Tree Pathology Co-operative Programme (TPCP).

Early in 1998, the forestry industry recognised that forest entomology did not form a logical part of the core business of the ICFR. Like pathology, this field of research is highly specialised and longer-term sustainability and capacity building requires a "critical mass" of active participants. Success in building the strongest team of plantation forest pathologists in the world through the TPCP illustrates this fact aptly. Thus, the entomology programme of the ICFR was terminated in 1998, and one of the entomologists joined the University of Pretoria, Forestry and Agricultural Biotechnology Institute (FABI). The long term vision here, developed after active consultation with key forest industry role players, was that forest entomology and forest pathology are "sister" disciplines that would best reside together. A further view was that it should be possible to establish a sound base of forest entomology, alongside the TPCP and that significant synergy would emerge from having these two programmes together. The ultimate goal would thus be to build forest entomology in South Africa

into a programme of international stature, like that of the TPCP.

During the course of 1999 and 2000, an effort was made to maintain some of the forest entomology capacity previously residing in the ICFR. The University of Pretoria provided a salary and infrastructure for one of the entomologists to maintain his research programme and to attract students into this fledgling forest entomology programme. However, field monitoring and some research programmes, previously residing in the ICFR, had to be suspended or at least significantly scaled down.

THE [illegible]NT PLAN UNFOLDS

It was clearly crucial for the forestry industry in South Africa to establish a firm programme in forest entomology, and to ensure that such a programme had long-term sustainability. Towards the end of 2000, the forestry industry committed and embarked on such a venture by establishing this programme within FABI (University of Pretoria). This had many advantages:

CRITICAL MASS AND CENTRALISED SUPPORT

Including forest entomology with forest pathology research, did for the first time, bring two closely related disciplines which are critically important to forestry, into one central fold. It was possible to capitalise on synergy emerging from a link with the TPCP, which covers the closely related field of forest pathology. FABI was established specifically to house the TPCP, which has gained national and international recognition for its activities in forest pathology education, disease monitoring, disease diagnosis as well as short and long term research. The fact that forest pathology is well established at FABI, suggests that the same successes can be achieved with forest entomology in the shorter, rather than the longer term. Postgraduate student training based on forest entomology projects will bring significant growth to the field and also ensure long term capacity in forest entomology.

FUNDING AND A LONGER TERM COMMITMENT

While forest entomology services and research have reached a serious level of attrition and dismemberment, there remains sufficient capacity to re-build a programme that will offer the forestry industry the security it requires and deserves. Establishment (10 years ago) of the TPCP has shown that a world-class programme in the field of forest protection can reside in a University environment. Also that it can provide a balance of the core products and services to both the education and industry sectors. This however, required that the forest industry commit itself to a relatively long term funding model. Access to University and State funding made it possible to augment Industry funding substantially. In the case of pathology, a point has been reached (growth is gradual and depends on the scientific accomplishment of researchers), where industry funds are matched in a 2:1 ratio, or better. This was significantly more advantageous to the industry than to allocate the forest entomology brief to one of South Africa's statutory organisations.

CONCLUSION

There was an urgent need to throw a "lifeline" to the dwindling forest entomology base in South Africa. The opportunity also existed, for the first time in many years, to establish a unified effort in this field as well as to gain from the synergy of linking it to a well established programme in forest pathology. We now have a new and dynamic forest entomology programme in place. The aim must now be to allow this fledgling programme to grow.

TAXONOMIC RELATIONSHIPS IN THE *SPOROTHRIX EUCALYPTI* COMPLEX

Sporothrix eucalypti is a pathogen of increasing importance on young *Eucalyptus* trees in South Africa. Two species morphologically similar to *S. eucalypti*, namely *S. pusilla* and *S. pitereka*, have been found on *Eucalyptus* in Thailand and *Corymbia* in Australia, respectively. The latter fungus is a serious pathogen causing shoot dieback in young plantations. A new genus, *Quambalaria*, has recently been erected to accommodate these three species. It was suggested that this anamorph genus should be classified either within the Exobasidiales or the Ustilaginales, based on the absence of dolipore septa. The aim of this study was to investigate the relationship between the three *Quambalaria* species, and to confirm whether they should reside in a single genus. We also wished to determine the ordinal relationships of these species and whether they should be classified as anamorphic Basidiomycetes. Light microscopy and rDNA sequencing (ITS 1 & 2) were employed to investigate the relatedness of the species. To determine the higher classification, TEM, as well as nuclear and mitochondrial rDNA sequencing were used. The results showed that *Q. eucalypti* isolates from South Africa are morphologically similar to isolates from diseased plants in Australia. This observation was confirmed with ITS sequences. This suggests that current outbreaks of disease in Australia are caused by *Q. eucalypti*, and not by *Q. pitereka*, as was previously hypothesised. The results also confirmed that *Q. pusilla* should be maintained as a separate species, and that all three species belong to the same genus. TEM showed that septa contain well-structured dolipores with imperforate parenthosomes, typical of the Basidiomycete order Dacrymycetales. The Basidiomycete affinities of the three species were confirmed with rDNA sequencing.

SASPP 2001 ABSTRACT

GRADUATIONS WITH A FORESTRY TOPIC IN THE TPCP GROUP

Emma Steenkamp - Ph.D

Molecular taxonomic studies of selected species in the *Gibberella fujikuroi* complex.

Riana Jacobs - M.Sc.

The genus *Phialocephala:* A taxonomic Study.

Brett Hurley - BSc.(Honours)

Entomology An Investigation of the Biological Control of *Gonipterus scutellatus* (Coleoptera: Curculionidae).

Ronald Heath - B.Tech. degree in Forestry from Saasveld.

Announcements

WELCOME TO NEW TPCP STUDENTS/STAFF

Rodrigo Ahumada from Chile – Studing *Mycosphaerella* spp. for his Masters degree.

Carlos Rodas from Colombia – Studying the diseases of *Eucalyptus* spp. in Colombia for his Masters degree.

Grace Nakabonge from Uganda – Studying the diseases of plantation forestry species in Uganda for her Masters degree.

Mauricio Maurin from Colombia – Studying *Ceratocystis* spp. and their viruses towards his Ph.D degree.

Deshni Pillay – Studying the pitch canker pathogen (*Fusarium circinatum*) for her honours degree.

Gerda Vermeulen – Working on *Botryosphaeria* spp. for her honours degree.

CERATOCYSTIS WILT OF FORESTRY TREES

Ceratocystis species include some of the most important pathogens of agricultural crops and trees. Diseases associated with this group of fungi include black rot of sweet potato and oak wilt. In commercial forestry plantations two species of *Ceratocystis* have been identified as the causal agents of wilt. *Ceratocystis albofundus* causes rapid wilt and death, accompanied with stem cankers and gummosis on *Acacia mearnsii* in South Africa. *Ceratocystis fimbriata* is the cause of a wilt diseases of *Eucalyptus* in Africa and South America. It also causes death of *A. mangium* and has been reported from *A. mearnsii*. These two *Ceratocystis* species are believed to be closely related to each other but very little is known regarding their distribution and impact on forest crops. In a survey of diseases of plantation trees in Uganda, *C. albofundus* and *C. fimbriata* were isolated from *A. mearnsii* and *E. grandis* respectively. Both hosts showed symptoms of wilt and death and the characteristic irregular (streaked) brown discoloration of the xylem. *Acacia mearnsii* trees also displayed extensive gummosis and stem cankers. This was the first report of *C. fimbriata* from East Africa and more importantly the first report of *C. albofundus* outside South Africa. It clearly, indicates that the pathogen has a much wider distribution than previously believed. Our study has shown for the first time that *C. albofundus* occurs outside South Africa. Similarly to the South African situation, it was isolated from wounded trees and from a temperate area in Uganda. This is in contrast to *C. fimbriata,* that was isolated from a tropical area of Uganda. Both diseases have already resulted in Considerable damage to plantations in Uganda. Future research will include the collection of a population of each of these pathogens to expand our knowledge on their possible origins.

SASPP 2001 ABSTRACT

PATHOGENICITY OF *OPHIOSTOMA IPS*, *LEPTOGRAPHIUM SERPENS* AND *L. LUNDBERGII* TO PINES IN SOUTH AFRICA

Three exotic bark beetle (Coleoptera: Scolytidae) species, *Hylastes angustatus* (Herbst), *Hylurgus ligniperda* (Fabricius), and *Orthotomicus erosus* (Wollaston), are known to occur on mature *Pinus* species in South Africa. These bark beetles are generally considered as secondary pests, but can also act as vectors, particularly ophiostomatoid fungi. In South Africa, nine ophiostomatoid species are associated with these three beetle species. *Ophiostoma ips* (Rumb.) Nannf., *Leptographium lundbergii* Lagerb. & Melin, and *L. serpens* (Goid.) M. J. Wingfield, are the dominant associates. Like most ophiostomatoid fungi, they can cause sapstain, but have also been reported as pathogenic to pines in other parts of the world. The aim of this study was to test the pathogenicity of the dominant fungal associates of bark beetles to pines in South Africa. Two isolates of each of *O. ips*, *L. serpens* and *L. lundbergii*, were used. Field inoculations were conducted in both the Knysna and Sabie areas. In Knysna, two pine species (*P. radiata* and *P. elliottii*) were selected for inoculations, while in Sabie, *P. elliottii* and a hybrid of *P. elliottii* and *P. caribacea* were used. Twenty trees of each species were inoculated with each test isolate and an equal number of trees served as controls. One branch per tree was inoculated and the entire trials were repeated after six weeks by inoculating a second branch of the same tree. Branches were examined six weeks after inoculation, and lesion lengths and branch diameters measured. Reisolations of the test fungi were done at the same time. Resin exudation and sapwood discoloration was visible around inoculation point, but no signs of branch dieback were seen. A statistical analysis of the data was conducted where differences between times of inoculation, tree species and fungi were evaluated. There were significant differences in lesion length between species inoculated, times of inoculation and plantation areas. Although *O. ips* gave rise to longer lesions than *L. serpens* and *L. lundbergii*, our results suggest that none of these species should be considered as serious pathogens in South Africa.

SASPP 2001 ABSTRACT

DEVELOPMENT OF MICROSATELLITE MARKERS FOR *CERATOCYSTIS FIMBRIATA*.

Ceratocystis fimbriata is a serious wilt and canker stain pathogen of many economically important agricultural crops. It has a world-wide distribution but was only recorded in Africa in the last decade. In 1997, this pathogen was found for the first time in the Republic of Congo where it causes death of *Eucalyptus* clones. The aim of this study was to develop microsatellite markers for *C. fimbriata*, to be used in detailed studies on the population diversity of the pathogen. RAMS primers were used to target specific microsatellite regions. The various bands produced from the RAMS reactions were cloned and sequenced. Primer pairs were designed to flank the microsatellite regions and tested for polymorphisms. Ten polymorphic primers were selected and used to study a Congo population of 32 *C. fimbriata* isolates and 20 *C. fimbriata* isolates from a number of different hosts and wide geographic distribution. Results indicate that genotypic diversity was low for the Congo population. This suggests that *C. fimbriata* was introduced into Congo. Future population studies of *C. fimbriata*, as well as other *Ceratocystis* spp., will be conducted using the polymorphic microsatellite markers, produced in this study.

SASPP 2001 ABSTRACT

IMPORTANT PLEASE READ THIS

In order for us to coordinate our services to you please help us by using the following contact address:

POSTAL ADDRESS

Tree Pathology Co-operative Programme
Att: Prof. Michael J. Wingfield
Mondi Professor of Forest Pathology and
Director of FABI
Forestry and Agricultural Biotechnology
Institute (FABI)
University of Pretoria 0002

STREET ADDRESS FOR DELIVERIES

74 Lunnon Road (between
Tindall and Herold Street)
Hillcrest
Pretoria

Tel: 012-420 3939 Fax: 012-420 3960

E-mail: Mike.Wingfield@fabi.up.ac.za

Web page: ttp//www.up.ac.za/academic/fabi/tpcp

Diagnostic Services: Prof Teresa Coutinho
Field Services: Dr Jolanda Roux
Entomology: Prem Govender and Brett Hurley

Web page: http//www.up.ac.za/academic/fabi/tpcp

Layout and design by Susan Christie