tree pathology news

NEWSLETTER OF THE TREE PATHOLOGY COOPERATIVE PROGRAMME
UNIVERSITY OF PRETORIA

NO 18

NOVEMBER 1998

DIRECTOR'S REPORT

People say 'it never rains but it pours'. Quite an appropriate idiom given the fact that, after a long dry winter in Pretoria, we have just enjoyed our first really heavy rain. One of the real attractions of the highveld (at least in my view) are the wonderful afternoon thunder showers, and the amazing electrical storms with lightning and thunder and sometimes also good rain. The heavy rains and associated accompaniments rather reminds me of the last few months and our arrival at the Fabulous FABI. Much joy and excitement, together with oh! so many teething problems. These have even included a leaking door which was only discovered this morning, after the rains I have just mentioned.

We are just about to end our first six months in FABI. As I mentioned in our last newsletter, the move was planned in such a way as to cause as little disruption as possible to research projects. For one thing, the Diagnostic Services of the TPCP continued amazingly effectively – although from our end there were the expected frustrations. We all owe a great vote of thanks to Teresa Coutinho who manages this part of the Programme for her dogged determination to ensure that the best possible service was provided.

One of the key objectives during the first phase of our time in FABI has been to 'introduce' our friends and colleagues to our wonderful new home. We have thus arranged and enjoyed visits from many friends linked to the South African Forestry Industry. These have included a visit from Mondi staff linked to re-establishment of the Mondi endowed chair in Forest Pathology; a visit from Gauteng members of the South African Institute of Forestry; a group from SAFCOL as well as many visits from individual staff of TPCP member Companies. In addition to these visits, we have worked feverishly at getting to know our new colleagues on the Campus of the University of Pretoria and have thus arranged tours of FABI for various 'in house' groups. To cap all of these visits, parties and tours, an OPEN DAY was held for members of the public on the 19th September which resulted in about 150 people being shown various of our Forest Pathology activities.

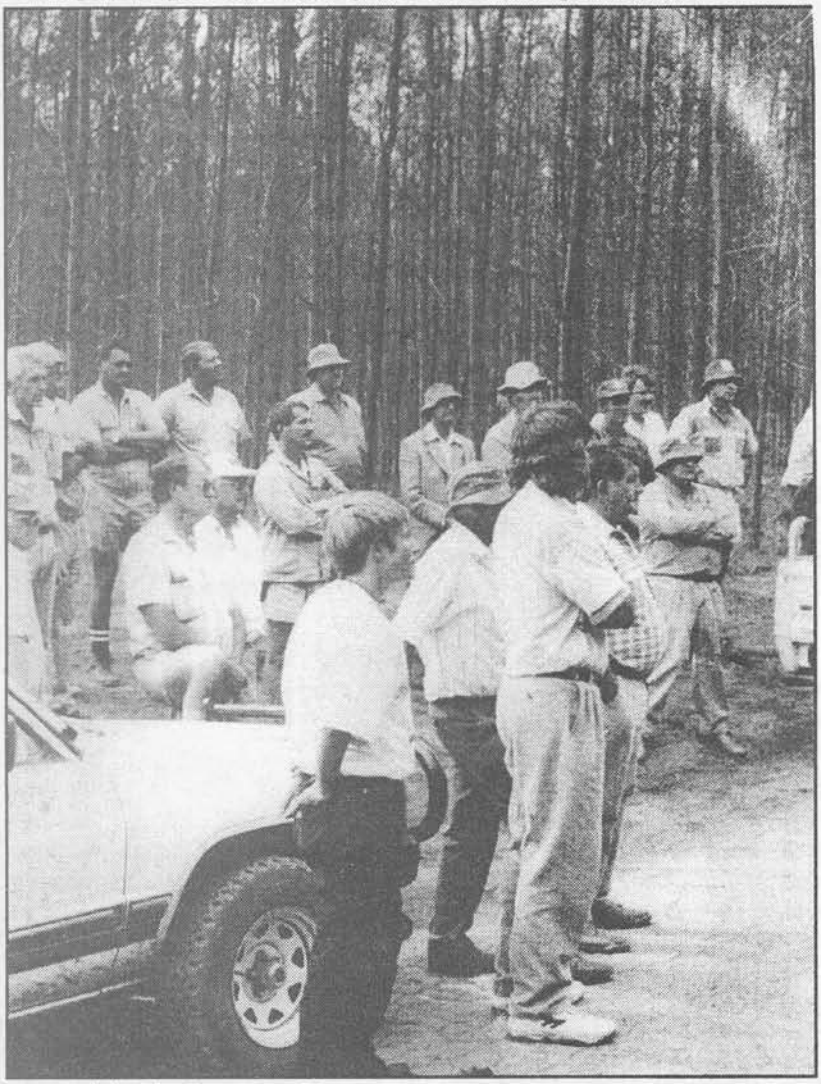
While we have made a very distinct effort to expose our friends in Forestry to the facilities of FABI, we are far from meeting with our objective. During the next month, we hope to have visits from key Sappi staff and to also entertain a group from DWAF. The 'grand finale' in the process of sharing our facilities with colleagues will be at the time of the annual meeting of the TPCP when we will also hold a formal inauguration of FABI. Expect to hear more about this special event in coming months.

Tienie van Vuuren and Mike Wingfield discussing FABI over a cup of tea

One of the highlights of the past few months was the 7th International Congress of Plant Pathology (ICPP), which is held every five years. This is the premium event in the calendar of plant pathologists the world over. For many members of the FABI family, this meeting was a special one. We were able to help about 21 of our group to attend this meeting in Edinburgh. This contributed to the fact

that, of the 90 countries represented at the meeting, South Africa ranked 9th, with 63 delegate countries. An amazing accomplishment! Although all of us that attended the meeting are now suffering from the financial consequences of the undertaking, I doubt that there is a single person who questions whether this was worthwhile. Read more about the event in the pages of this newsletter.

The TPCP move to FABI has led to many new and unexpected opportunities for growth. For example, more or less concurrent with our move came a decision by AECI to close down their Plant Biotechnology research programme. This development provided the University of Pretoria and FABI with the opportunity to absorb the research programme of Dr Karl Kunert. Karl is one of South Africa's best plant molecular biologists and he joined FABI at the beginning of August. As part of this move, AECI allowed him to move all his equipment to the Institute and also provided a generous start up fund to help him become established in his new home. Karl has had considerable experience in the fields of developing plant fingerprinting tools and in plant pathogen interactions which are key areas of interest for us. It is not surprising that his move to FABI is already proving to be most beneficial to us all, and is adding considerable impetus to both TPCP and FMBC (Forest Molecular Biology Co-operative) projects.



Jolanda Roux and foresters at a field day organised by NTC

Jolanda Roux, the TPCP manager of Field Services has been working non stop since the Programme arrived at FABI. She has presented field days and undertaken field work most every week since that time. To add to this hectic schedule, Jollie spent a week in Congo at the invitation of Unite de Recherche Sur La Productivite des Plantations industrielles and Eucalyptus du Congo SA where she conducted an intensive, but preliminary survey of *Eucalyptus* diseases. The results of this undertaking have been most amazing to us and have led to the discovery of some diseases that potentially threaten forestry in South Africa. Please look forward to hearing more about this at our annual meeting next year. A consequence of Jolanda's very busy programme has meant that she has not been able to complete her Ph.D. as soon as we all had hoped. She has consequently taken up an invitation from Dr. Tom Harrington of Iowa State University to work in his laboratory for a month and to complete a key component of her studies. Although we all miss her presence here, this is a wonderful opportunity and will make it possible for her to complete the already well-earned doctorate by the end of the year.

I should not end this introductory message without mentioning some diseases and TPCP breakthroughs. The problem is that there is just so much going on in the programme. I am thus always pressed when writing such documents to choose appropriate diseases to mention. One also does not wish to be biased to one or another research component of the Programme. On the good news side, I can say that no new and threatening diseases have emerged in recent months. On the general interest side, Bernard Slippers has shown quite conclusively (and using the most unusual approach of looking at the *Amylostereum* symbiont), that the first introduction of *Sirex* into South Africa did not originate from Australia, but most likely reached us from South America. Percy Chimwamorombe has completed the mammoth task of sequencing the entire Polygalacturonase Inhibiting Protein (PGIP) gene thought to be related to disease tolerance in eucalypts. Oliver Preisig and his team continues to make amazing progress in his efforts to establish a biological control for *Sphaeropsis sapinea* (*Diplodia pinea*). I could go on and on – but details will follow of these and other accomplishments in future newsletters and presentations at meetings. So these few comments are merely to whet your appetite.

Moving to FABI has added a tremendous impetus to the activities and opportunities of the TPCP. This will be pertinently obvious to those of you that have already visited us. As you know, the TPCP welcomes guests and we hope that, if you have not already done so, that you will visit us soon. For readers situated far from Pretoria, plan to attend the TPCP annual meeting. This is sure to be a bumper event and a strong token of our central aim of KEEPING TREES HEALTHY.

THE TPCP AND FOREST CERTIFICATION

In the previous issue of TPCP news, we reported on the Forest Certification Training Course that Jolanda Roux attended in May this year. This course is aimed at introducing Forest Certification to the Forestry Industry and has lead to the initiation of certification in a number of countries. It may be asked what the role and interest of the TPCP is in attending such a course. In this article we hope to provide you with the answers to this question, as well as to provide you with some information on the implications of certification to future trends in forestry.

Consider the following statements contained in the ten FSC principles:

"Measures shall be taken to prevent and minimize **outbreaks of pests, diseases**, fire and invasive plant introductions. **Integrated pest management** shall form an essential part of the management plan, with primary reliance **on prevention and biological control** methods, rather than chemical pesticides and fertilizers."

"Use of **genetically modified organisms** shall be prohibited"

"Management shall promote the development and adoption of environmentally friendly **non-chemical methods of pest management** and strive to avoid the use of chemical pesticides"

"Exotic species, which shall be used only when their performance is greater than that of native species, shall be carefully **monitored to detect unusual mortality, disease** or insect outbreaks and adverse ecological impacts"

"Use of **biological control** agents shall be documented, minimized, monitored and strictly controlled in accordance with national laws and internationally accepted scientific protocols"

As a partner of South African forestry companies, it is the responsibility of the TPCP to ensure that all these criteria are practised in an efficient manner. Many of the projects by TPCP and Forest Molecular Biology Co-operative (FMBC) staff and students directly address the issues stated above. We strive to provide members with management guidelines to prevent and minimize disease outbreaks. With the clonal screening programmes, members are reducing the impact and occurrence of diseases. Guidelines have been developed for the identification of diseases, thus assisting in the early reporting of disease outbreaks and the occurrence of new diseases. In co-operation with the Mensuration and

Modelling Research Consortium (MMRC) disease scoring guidelines have been developed to assist in the evaluation of Permanent Sampling Plots (PSP's). We also provide a source of information and technology transfer through which foresters are introduced to diseases and informed as to their impact and importance.

In the interest of promoting the future of forestry in South Africa, the TPCP strives to be pro-active and at the cutting-edge of Forest Science related to diseases and biotechnology. We currently have projects addressing the use of possible biological control strategies for Cryphonectria canker, pitch canker and Sphaeropsis die-back and canker. Clonal evaluation programmes for the early identification of disease susceptible plants are ongoing and of increasing value to members. Techniques, either through inoculation or the use of molecular markers, are being developed to optimize the screening process and to apply them to pathogens other than *Cryphonectria*.

Genetically Modified Organisms (GMO's) have a number of advantages over the use of expensive and environmentally hazardous chemicals. They are also more stable than the application of biological control agents and are finding increased uses in plant biotechnology world-wide. Genes from a number of bacteria have been successfully inserted in to agricultural plants to make these plants resistant to insect attack. Genes providing herbicide resistance are also receiving much attention and are currently being tested extensively for *Eucalyptus* spp. This allows the spraying of herbicides over an entire field, without damaging the crop. GMO's have also been developed with resistance to microbial infection. GMO's thus provide great opportunity for increased yields and less hazardous management of pests and diseases. The TPCP and FMBC have a number of projects involving production of genetically modified trees and biological control agents. The impact of the FSC principles on the use of these products will require attention.

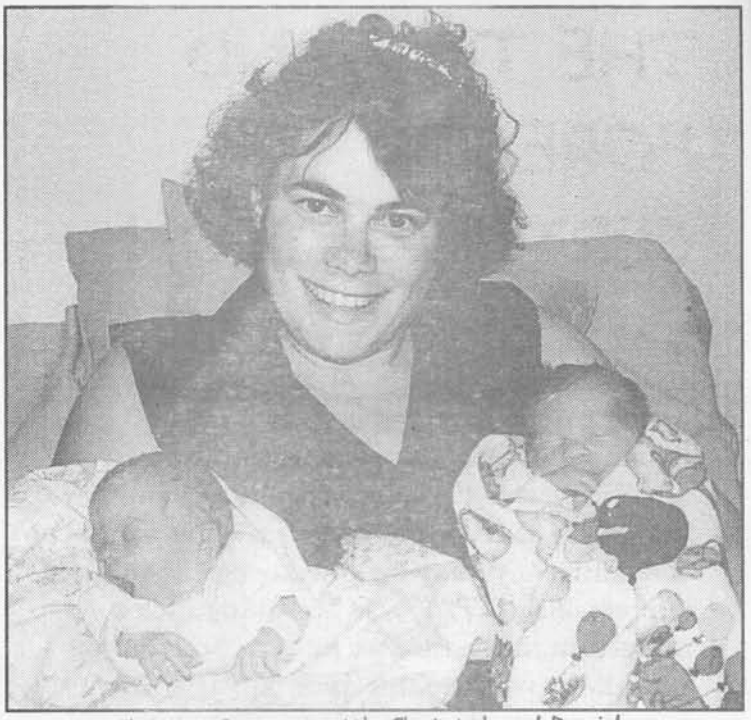
Forest certification may be a relatively new term, but the concept of sustainable forestry has been known and implemented in South Africa for many years. With forestry companies ensuring environmentally friendly silvicultural, social and economic management, the TPCP strives towards ensuring disease free plantations and nurseries, utilizing environmentally friendly techniques. Together we will keep South Africa's plantations healthy, economically viable, environmentally friendly, socially acceptable and certified!

THE HAVENGA PRIZE
AWARDED TO

MIKE WINGFIELD

At the "Akademie vir Kuns en Wetenskap" prize giving held in Pretoria recently, Mike was awarded the prestigious Havenga Prize for his research activities in Biology. The prize is awarded annually to biologists who have conducted outstanding original research in the broad field of biology.

Well done Mike!!!



Christa Coetsee with Christel and David - the fourth set of twins in the TPCP group

Politics at ICPP98

At ICPP, a recent political event in Switzerland was at least mentioned twice by presenters. Swiss citizens had to vote in June on the 'Genetic Protection Initiative'. This popular initiative, a tool of Swiss democracy, was aimed at banning the production of genetically modified animals, the dispersal of transgenic organisms in nature and patenting animals and plants transformed by genetic technology. If the initiative was accepted by the citizens of Switzerland it would have imposed severe restrictions on genetic engineering used in many research labs at universities as well as in industry. Researchers were anxious about the outcome of this vote and they began an extensive information campaign. A recent Nobel price winner used his price money to support the campaign. Most people did not know the meaning of genetic engineering. There was some fear about this new technology. Academics had neglected to inform the public about the implications genetic engineering has for the production of medicines and food and the protection of the environment and agriculture. The initiative was ultimately rejected by more than two third majority. After the turmoil in the run-up to the vote, the researchers could finally go back to work and will hopefully have learnt to communicate with the public in future.

Water has profoundly affected the course of human history. Its abundance has helped societies to flourish, its scarcity has caused them to wither. No consideration of history or of the fate of societies, past or present, can ignore its role. It therefore behooves us to consider the status of water supplies in global terms, for although water covers so much of the earth's surface, it is not universally found in the quality and amount needed

from "Out of the earth - civilization and the life of the soil" by Daniel Hillel

ENDOPHYTES

by Dr. Dennis Wilson

When it comes to fungi and forests, what you can't see is often as important as what you can. At first sight a healthy tree may appear as an almost sterile entity, one that has denied entry to fungi and bacteria and is, therefore, devoid of microorganisms. In contrast a diseased tree is one that has become penetrated and debilitated by microbial infection. However, trees are not simply a collection of plant cells that form tissues, and tissues that collectively make up the roots, shoots, and leaves to form an individual. Instead trees are an integration of plant cells with fungal cells, from the mycorrhizae that form ubiquitous mutualistic associations with the roots, to fungi referred to as fungal endophytes that infect the leaves and stems of plants but cause no visible symptoms of disease. Research on fungal endophytes of trees over the past two decades has shown that virtually every leaf and stem of every tree is infected with fungal endophytes. Yet because they cause no visible signs or symptoms of infection, the casual observer is oblivious to their ubiquity. However, relatively simple techniques can be employed to identify and enumerate the assemblage of fungal species that occupy each host plant. Healthy looking plant material freshly removed from the tree, such as a leaf, a twig section, or bark sample, is rigorously surface sterilized to eradicate "tourist" microbes that inhabit the outer surface of the plant. The plant material can then be cut into small segments (1 cm length of twig, or 1 cm^2 leaf or bark sample) and platted out on any standard media used to culture fungi. Within several days to a week, or more, fungal endophytes begin to grow from the plant material. It is clear that different plant species, different clones of a species, and even different individuals of the same clone can harbor quantitatively and qualitatively different endophyte populations.

The biological role of fungal endophytes in trees is complex and varied, but several avenues of research have shown that endophytes interact directly with the host tree, and indirectly via effects on organisms that themselves interact with the tree, such as insects and other fungi. Research on endophytes from eucalyptus and pine in South Africa has shown that several economically important pathogenic fungi, such as *Botryosphaeria* sp. and *Sphaeropsis* sp., are commonly isolated from healthy plant tissue. These fungi presumably adopt a "sit and wait" strategy, where they infect their particular host causing no disease symptoms until particular environmental conditions that stress the trees are present. Such conditions include hot winds for *Botryosphaeria* sp. and hail for *Sphaeropsis* sp., which trigger a "Dr. Jekyll & Mr. Hyde" type of transition from an endophytic state to a pathogenic state. If the trigger is not present, disease symptoms may never develop and the tree can remain healthy despite the presence of the disease causing fungi. In contrast, an endophytic phase in the life cycle of the fungus may be absent with some host trees or under some conditions and disease symptoms may swiftly follow infection. The majority of the research on endophytes has focuses on a mutualistic interaction with the host tree where these fungi provide protection from insects and pathogens, but to date none of this work has included forest trees in South Africa. Certain leaf endophytes can cause insect mortality via the production of insecticidal toxins or in some gall insects, by invading the insect gall and preventing the insect from feeding. In a more complex interaction, a leafmining insect caused increased endophyte infection of leaves,

presumably by providing an infection site on wounded tissue following feeding, which then caused premature leaf abscission. Since the leafminers were restricted to a single leaf, the insects could not complete development and died when the leaves abscised.

Over evolutionary time, the insects have appeared to respond to mortality from endophyte-driven premature abscission by preferentially occupying larger leaves that have a lower propensity to abscise, because larger leaves have lower endophyte levels relative to smaller leaves. Probably the most interesting example of endophyte-mediated protection of trees involves an endophyte that is a natural biocontrol agent of Dutch elm disease caused by Ophiostoma; from parts of the UK. A species of Phomopsis that occupies the inner bark of Elm trees growing in wet sites is an antagonist of O. ulmi and prevents it from colonizing and therefore killing the trees. Further, this species of Phomopsis also produces a volatile compound that acts as an oviposition deterrent of the bark beetles that carry O. ulmi.

Fungal endophytes clearly have diverse, by as yet, poorly understood roles in the forest ecosystem. Understanding their distribution and infection patterns among sites and tree species may yield valuable information about the original of fungal pathogens, or fungi that may pose a threat in the future. In addition, exploitation of the naturally occurring mutualistic properties of endophytes may form part of integrated pest management strategies, which augment existing control measures.

Biotechnologists may consider endophytes as vehicles to introduce novel genes into trees, since genetically modifying fungi may be easier than modifying trees. Useful genes can be engineered into endophytes that in turn infect the target trees. Fungal endophyte research is still in its infancy, but will be a fruitful and important area of future research.

Lessons learned at ICPP98.....

from a population biology point of view

report by Schalk van Heerden

There has been an upsurge of interest in population biology of fungal plant pathogens over the past few years. Population biology is a fascinating field of study and overlaps with a lot of different fields. The session included excellent speakers, many of whom you may remember from previous visits to South Africa, for instance Linda Kohn, Bruce McDonald, Michael Milgroom and Andre Drenth. Personally, the lesson learnt was regarding the formulation of the biological question. Before you start an experiment - in this case in population biology - it is of utmost importance to know what the question is. This will influence the sampling strategy and data analysis and will ensure that you will not have to redo the experiment. The greatest benefit I gained from attending ICPP was the personal contact I made with colleagues and sharing their ideas and input.

Liquid water is the most plentiful substance on earth, covering more than two-thirds of its surface in oceans, seas, and lakes. Even the continental areas are frequently charged with and shaped by water. In vapour form, water is always present in the atmosphere. It is our planet's most distinctive and active agent.

from "Out of the earth - civilization and the life of the soil" by Daniel Hillel

FOREST PATHOLOGY

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THE SCOTTISH APPROACH

Many TPCP team members had the opportunity to attend the 7th International Congress for Plant Pathology (ICPP) in Edinburgh in Scotland during August. As part of the ICPP, a number of field trips were organized. One of these field trips was the Forest Pathology field tour to the Scottish Highlands. Such field trips are extremely valuable as they expose one to a range of new diseases. They also provide opportunities to gain valuable insight into resolving research problems. Viewing trees in the Scottish Highlands highlighted the advantages of fast growing plantations. Imagine planting a tree and not being able to see it reach maturity!! Our Scottish colleagues certainly have long-term planning as one of their priorities.

The field tour was three days long and was spent looking at problems concerning pine and spruce forestry. Scotland has only one native forestry tree species and that is the Scots pine (*Pinus sylvestris*). All other forestry species, such as larch, spruce and other pines, have been introduced from other European countries - **together with a range of fungal pathogens and insect pests.** Apart from Armillaria root rot, diseases in Scotland differ entirely from those known to us in South Africa.

One of the most serious tree disease problems in Scotland is root and wood rot caused by the basidiomycete (mushroom family) *Heterobasidion annosum*. This fungus is a problem on pine and spruce in Europe and North America. Control of annosum root rot is often achieved by stump treatment after harvesting. Spores of this fungus colonize freshly cut stumps and the fungus then spreads to healthy trees via root grafts. Management of this disease thus relies on the treatment of all cut stumps with either a fungicide or with a biological control agent. Biological control is achieved by applying another, non-pathogenic fungus, to the surface of stumps immediately after cutting. This fungus, *Phlebia gigantea*, colonizes stumps, thus preventing *Heterobasidion* from infecting them. The fungicides or bio-control agent can be applied either manually (Fig. 1) or with the same machine that is used to fell trees (Fig. 2).

Other diseases encountered on the field tour included a number of needle diseases, a stem disease called "resin top disease" and blue stain, caused by *Ceratocystis laricicola*, associated with attack by the beetle, *Ips cembrae*. Armillaria root rot occurs mostly on lower slopes of hills and other areas where human activity has taken place in the past. Like the trees in Scotland, most diseases there are also slow to colonize their hosts when compared to diseases such as Cryphonectria canker, bacterial and Ceratocystis wilt in South Africa. Careful monitoring and research on diseases, however, forms an important part of Scottish forestry and will continue, especially as forestry moves towards clonal trees.

The field tour also provided us with the opportunity to look at one of the worlds most famous tree diseases. The disease is known as Dutch elm disease and it affects *Ulmus* spp. in Europe and North America. It is one of the classic examples in forest and plant pathology text books, and one that every student in the TPCP is aware of. This fungus has been devastating elm populations since the turn of the century. In countries such as the US, millions of elms have been killed. This disease has been known in England for many years and is still spreading through Scotland, killing susceptible elm species. It illustrates the dangers of introduced pathogens, since research suggests that the fungus originates from Asia, where it does not cause disease on native Asian elms. Quarantine measures should be enforced and care should be taken with the movement of plant material around the world. South Africa has been fortunate thus far and has not experienced exotic pathogens causing large scale losses to native trees.

The field tour was a wonderful experience and many new contacts have been made and old ones renewed. We are looking forward to collaborating with our new colleagues and showing them plantation forestry in South Africa.

Some of the TPCP group in Edingburgh

PLANT-PATHOGEN INTERACTIONS, ICPP98

Albé van der Merwe and Emma Steenkamp

The 7th International Congress of Plant Pathology (ICPP98), held in Edinburgh, Scotland, had a very strong theme of interaction between plants and the pathogens that plague them. It is important to understand how pathogens and plants interact with each other, in order to develop control strategies and to be able to predict the occurrence of outbreaks. Just looking at the titles of the various symposia held on the subject, one gets the feeling that molecular biology, cell biology and virology are considered pivotal sciences to study these interactions.

It would be a futile task to discuss all the interesting and cutting-edge science papers and posters that have been presented on the subject. A total of 96 speakers presented papers, each followed by a discussion session. It was usually in this latter part that the interesting topics were touched on, and with a discussion led by world-renowned scientists like Don Nuss on the topic of G-proteins, a wealth of information could be gathered within a few minutes. The intellectual surroundings and conversations were absolutely mind-boggling, and very stimulating.

Particularly interesting to those of us working within the TPCP was the topic of "Molecular Biology of Fungal Pathogenicity". The past few years have seen a boom in research dealing with pathogenicity and the genes that code for pathogenicity-determining factors. These include certain components of signal-transduction pathways, hydrophobins, and antibiotic-detoxifying enzymes. Factors which kill plant cells and cause necrosis, or modify the cells' functions, also enjoyed considerable attention. An example of the recent advancements in this field is the development of Restriction Enzyme-Mediated Integration (REMI), by which new pathogenicity factors can be identified without previous knowledge of their functions. The completion of the genomic sequence project on yeast (*Saccharomyces cerevisiae*), has also introduced a wealth of new ideas, powerful tools and possibilities. Application of these approaches to plant-pathogen interactions will assist in identifying similar components in important South African pathogens, such as *Fusarium subglutinans* f.sp. *pini*, *Botryosphaeria dothidea*, and *Cryphonectria cubensis*.

By taking the data available on plant-pathogen interactions into account, as well as the effect this knowledge has already had on the industry in other parts of the world, it is possible to argue that plant-pathogen interaction research will expand drastically over the next few years in South Africa. Pursuing the important facets of plant-pathogen interactions will ultimately lead to a better understanding of pathogenesis. This will be important to the protection of economically important crops in South Africa and the rest of the world alike.

The ICPP Edinburgh Congress:

the fun part.

Edinburgh, the scenic city of great warriors such as William Wallis or better know as "Braveheart", was the venue for the 7th International Congress of Plant Pathology. A significant part of the FABI team of young and upcoming scientists set out to present themselves at this great congress and what a magnificent trip across the Mediterranean and North Seas to Scotland, it was. Edinburgh was a buzz of people, colour, sound and festivities as it was not only great scientists roaming the streets but also pleasure junkies and art freaks attending and contributing to the annual Edinburgh Fringe Festival.

The vibrant vibes of Edinburgh were strong enough (and mysterious enough) to trigger the wanderlust of the congress attending Fabians (we are of cause "explorers of the unknown = scientists!"). Walking up the Royal Mile to the Edinburgh Castle regressed

one back in time.....I could hear the sound of war chants and bagpipes. It was not all imagination because on every second corner a Scottish piper would stand blowing on his bagpipes and one could not but help to wonder what really was underneath their kilts? The braver ones among us did a midnight walk through the streets of Edinburgh and the vaults underneath the city. Tales of slaughters and brutality were told and I have to admit shivers ran down my spine more than once. To relax the nerves again there were a whole array of beautiful old pubs where hearty laughter greeted one. After all, what will Edinburgh be without tasting home brewed beer.

Edinburgh had something to offer to all of us and the congress it self was filled with the most interesting science presented by the world's most famous scientists (you know, the people you only read about in articles and think: Wow!!). The week, however, flew by and the FABI-team boarded their planes, enriched with happy memories and great ideas, to return to home soil in sunny South Africa.

Left: Prof Tiens Erasmus, Vice Rector, UP, signing the contract to renew the Mondi Chair in Forest Pathology to Mike Wingfield. *Right*: Neville Denison at the same event.

Molecular biology and FABI –

a student's perspective

by Martin Coetzee

The Forestry and Agricultural Biotechnological Institute (FABI) makes it possible for new young scientists to explore different areas of research. These areas include not only newly discovered pathogens and their relationship with their hosts but also research based on modern advances in molecular biology. In this article I want to give the reader insight into where molecular biology has originated in the TPCP and new directions that have followed from this.

Exploration of mysterious DNA molecules have in the past been restricted to a limited number of research groups. In the early 1980's these groups mainly included chemists and biochemists in a variety of specialized fields. This situation, however, has drastically changed in the past few years with the accumulation of data, development of new techniques and the introduction of a new research field called "Molecular biology".

The study of biology at the molecular level, and here I only refer to the DNA level, is no longer limited to a few hi-tech labs around the world. This phenomenon is well demonstrated by the facilities available to do DNA based studies at the laboratories of FABI. Currently, these facilities are being shared by students working in the labs of FABI and students (including myself) located in the Agricultural and Biological Sciences building (Level 6, Labs α, β, and Ω). The labs at both FABI and Level 6 are equipped with some of the most modern necessities such as PCR machines, centrifuges and a automated DNA sequencer.

During the course of any study being done at FABI some aspect of molecular biology will be applied to either support data or to give insight to results obtained. Studies based on molecular techniques can essentially be divided in four

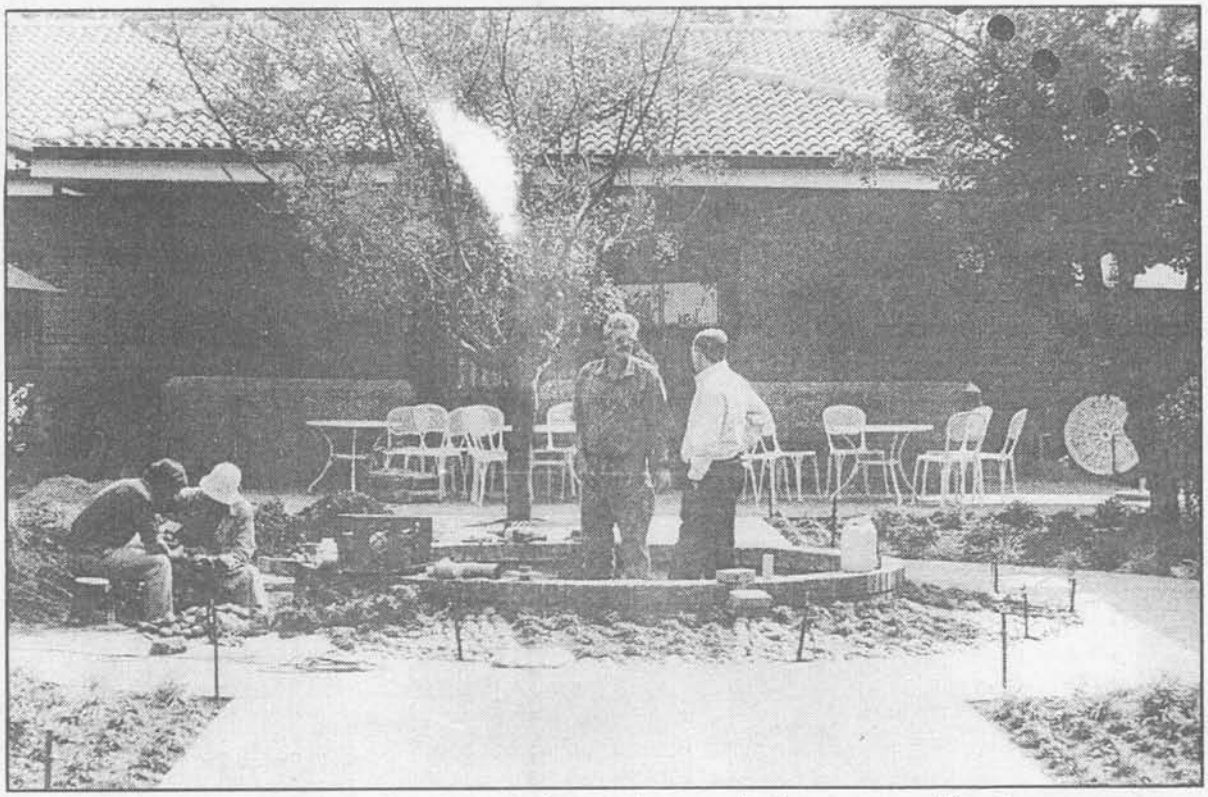
categories: 1) molecular systematics, 2) population genetics, 3) virology and 4) applied or basic molecular biology. Each of these categories, however, do not stand alone but very often is interwoven into each other, obscuring the distinct role that each play in contributing to a specific answer.

Looking back to where molecular biology has originated in the TPCP it is interesting to note that the use of molecular tools were only restricted to few elected individuals. These students were mainly under the guidance of Brenda Wingfield and were considered to be "weird" and sometimes a little bit eccentric. However, despite many critics they have laid the foundation for all molecular work being done by students in the TPCP. At that stage the "molecular group" of the TPCP were only limited to research in molecular systematics.

Systematics or the classification and relationship of organisms between each other is today one of the crucial aspects when describing new species. At FABI molecular systematics is no longer a study that is just being done by a few students but has become a major focus point where taxonomy is involved. Tools such as RFLPs and sequencing (especially with the availability of autosequencers) have become part of the every day life of students attempting to reveal the identity of any fungal pathogen. Molecular tools such as those mentioned are now being used with confidence to back morphological data. In situations where no morphological data are available, sequence data from specific DNA regions are compared for similarities with sequence data from known species being deposited in DNA sequence data banks.

Currently the TPCP and FMBC are leading the way to very exciting, new and fascinating studies based on molecular biology. Both programmes are still involved in molecular taxonomy and the development of quick and reliable techniques for the identification of fungal tree pathogens. However, virology, population genetics, the development of markers for tree breeding and basic or applied molecular biology are now the new areas of attention. Research in these areas are mainly supervised by Brenda Wingfield and Anna-Maria Oberholster. As in the past many of the students involved in these programs are restricted to an esoteric few and are mainly interested in discovering and characterizing new genes such as mating type genes and resistance genes with specific application to the forestry industry.

Molecular biology, although relatively young in the TPCP, have lead the route for new discoveries and development of molecular based techniques. The majority of students associated with FABI are using different molecular tools for diverse applications and is not restricted to a few students as in the past. In future, molecular biology will become more specialized and will play a major role in contributing to research done at FABI.



FABI's fabulous fish pond ..... during renovations

ICPP 1998

Lessons learnt in Biocontrol

The use of microorganisms to control pathogens of plants has developed into one of the major focuses of plant pathology today. At the Congress, entire sessions were devoted to research conducted in this field. Topics included the ecological basis of biological control, molecular approaches to biological control strategies and the practical status of biological control approaching the 21st century. Biological control strategies have been developed for a vast array of diseases and crops – from root to post-harvest diseases. Molecular approaches are now being implemented to improve the efficacy of biological control agents and to investigate the interactions between the pathogen and controlling agent. One of the fascinating presentations I attended on this topic was the use of bacterial endophytes as biological control agents. The researchers discovered that they could control

Ralstonia solanacearum, the cause of tomato wilt, using endophytic bacteria which occur in tomato plants. As this pathogen is also capable of causing Eucalyptus wilt, it would be interesting to establish whether or not eucalypts have endophytic bacteria in their roots and whether or not they are able to control the disease.

GERMAN TRANSGENIC CROP TRIALS FACE ATTACK

[Munich] The environment minister of the northern German state of Schleswig-Holstein is leading opposition to two planned field trials of generically modified crops in the state. The minister, Rainder Steenblock, says he want changes in federal law to give the 16 *Länder* (states) direct participation in the approval of such trials.

Steenblock's intervention is significant because he is a Green Party minister in a state administration governed by a 'Red-Green" coalition between his party and the Social Democrats. A similar coalition might take control of the federal government in next month's general election, and may then put its weight behind the popular opposition in Europe to the introduction of genetically modified crops.

The field trials, which are being carried out by the German company AgrEvo, involve *Brassica napus*, a species of transgenic rape. They were approved last month by the Robert Koch Institute (RKI) in Berlin, which is responsible for approving such trials throughout Germany.

Steenblock's objections are based on alleged concerns that the transgenes in AgrEvo's rape could be transferred to related crops and weeds, causing ecological problems. He criticizes the RKI for approving the trials without insisting on safety measures, and complains that it adopted a simplified approval procedure for AfrEvo, with no public inquiry, on the grounds that the company is already running similar trials in Lower Saxony.

He cites a case that occurred last spring in the state, in which a genetically modified aspen tree began to bud in its third year of growth, instead of its seventh year as is usual. Had the tree bloomed, he says, it would have presented a serious safety problem because the transgene concerned causes stunted growth. RKI's approval of the trial was contingent on the understanding that the trees would not be allowed to cross-pollinate. "This shows how unpredictable genetic engineering can be," says Steenblock.

It is unlikely that the RKI will accept Steenblock's demand for additional safety conditions for trials, however. Ulrich Ehlers, head of the registration office for genetic engineering at the RKI, says the federal authorities were convinced that the experiments were safe.

Even so, AgrEvo is unlikely to avoid a confrontation with Schleswig-Holstein. "If we want to sell these seeds in Schleswig-Holstein, we have to test them there," says a company spokesman.
Quirin Schlermeier

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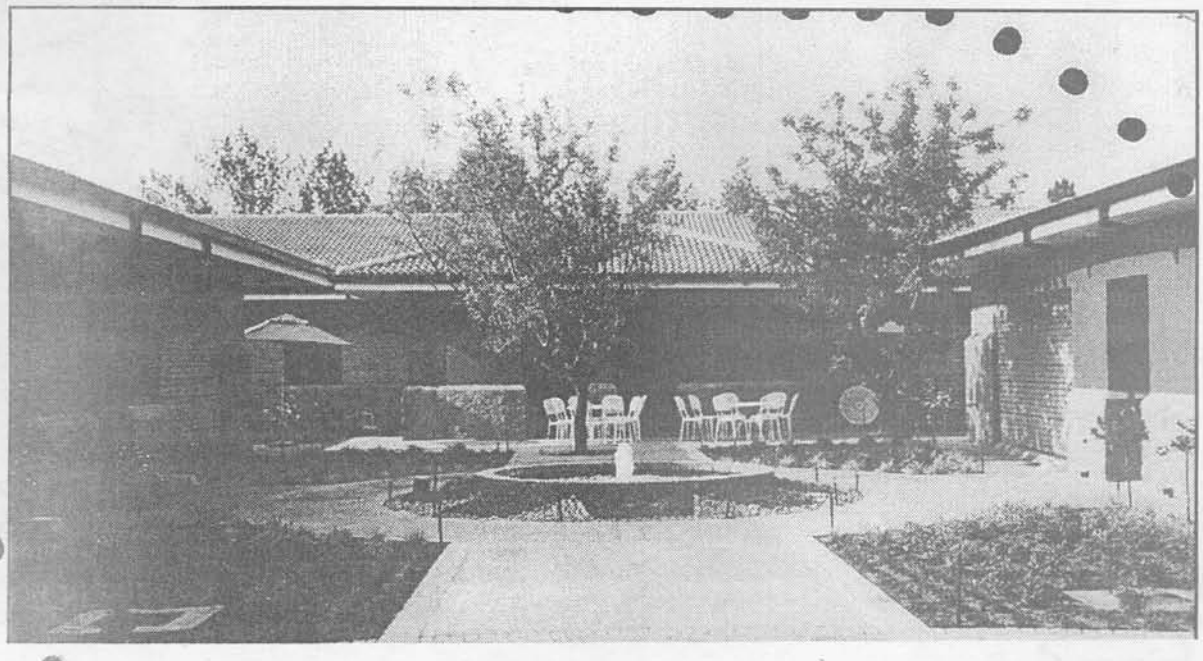

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THE RESEARCH TEAM OF THE TREE PATHOLOGY CO-OPERATIVE PROGRAMME

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, Dr. T.A.Coùtinho, Dr. A. Viljoen and Dr. T. Aveling), 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 FRD. Staff from various Departments in the University obviously provide advice and support where this is required.

IMPORTANT : PLEASE READ THIS

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