Formation of a Central Region Interest Group

The region extending from Vryheid to Ermelo comprises a substantial area of land under commercial timber production. There is also a high degree of diversity with respect to the physiographic and environmental factors encountered, many of which are unique to the area. The ICFR dedicates considerable research efforts to the Central Region, collaborating regularly with its sponsors. Recently, it was decided to form a Regional Interest Group, with representation from the ICFR and the various companies, to better serve this area in identifying current and relevant silvicultural issues and co-ordinating field days to address these.

Representatives from Mondi Forests, Sappi Forests, TWK Agriculture Ltd and NCT Forestry Co-operative met recently, in Piet Retief, to look at setting up this group. ICFR’s Paul Viero facilitated the meeting, with the objective of forming a committee to identify key silvicultural issues that could be addressed through two annual field days. At the meeting, Siggie von Fintel (TWK Agriculture Ltd) was elected Chairperson, with the rest of the committee comprising Eddie Ferreira (Sappi Forests), Mark Prigge (Mondi Forests), Johan Coetzer (NCT Forestry Co-operative) and Paul Viero (ICFR). It was agreed that a representative from CTC would also be appointed onto the committee so as to achieve full representation of the Interest Group. It was also agreed that the group would be multi-species in its approach operating along the lines of the successful Zululand Interest Group.

Issues that will be addressed through field days in February and November of 2004 include riparian delineation, site-species matching, site impacts, site preparation, alien weed control and killing of hard gum stumps (*Eucalyptus macarthurii*).

Contact: Siggie von Fintel (twk@twkagri.com) or Paul Viero (paul@icfr.unp.ac.za)

Impact of mechanical harvesting on coppice regeneration

Potential damage to eucalypt stumps following mechanical harvesting means that these stands are currently being re-planted rather than coppiced. Future trends dictate that this form of harvesting will play an increasingly important role in Zululand, and therefore a trial was set up to quantify the impact of mechanical harvesting on eucalypt coppicing ability.

The trial was implemented at Trust on Sappi property, on a stand of *Eucalyptus grandis* x *E. urophylla* (A 380). The following harvesting and extraction methods were tested:

1. Conventional manual felling, debarking and cross cutting. The timber was manually stacked adjacent to extraction routes, extracted by a Bell tractor and low bed trailer and loaded by a Bell 3-wheel logger.
2. Manual felling. This included mechanical debarking by a modified Bell 3-wheel logger. Cross cutting, stacking and extraction were as for 1.
3. As for 2, but the trailer was loaded by a Flexi-loader.
4. Mechanical felling, debarking, cross cutting and stacking (Waratah). Timber was extracted by a Bell forwarder, and loaded by a Flexi-loader.

After timber extraction, when the coppice shoots were approximately 1 m high, comprehensive measurements (24 individual measurements per stump) and assessments were made to determine the extent of damage to the stump as well as the number and position of coppice shoots. The first coppice reduction to two shoots per stump was carried out in March 2003 and final reduction to the original stocking will be carried out later this year. Following this, the data will be analysed, and a report compiled and presented at an appropriate field day.

Thanks are extended to all who helped in the planning and establishment of this trial, particularly Theunissen Rabie, Andrew King, Tim Netterville and Mark Hitchins of Sappi, and Piet Rheeder of Melanne Contractors (harvesting contractor).

Contact: Denis Oscroft (oscroft@absamail.co.za) or Keith Little (keith@icfr.unp.ac.za)
Establishing excellence in site classification

The inaugural meeting of the Forest Site Classification Working Group (FSCWG) was held at the ICFR on June 24th 2003. This is a forestry industry peer review group co-ordinated by the ICFR, to establish excellence in site classification based on the best growth and site information available, with the purpose of improving management planning at every level. The principles and objectives of the working group were established at the meeting, which was followed by a report back from Colin Smith and Richard Kunz on progress made to date and the methodology used to develop the classification. The objectives of the FSCWG are to:

- Synthesise all existing species and productivity data into a comprehensive site classification system which is clear, logical, and based, as far as possible, on scientific and where necessary, expert opinion, and
- Develop descriptive and quantitative relationships between species productivity and classification categories, based on site index, maximum mean annual increment (volume and mass) and optimum rotation age.

Colin outlined the benefits of a generic site classification, which include:
- A single point of entry for species requirements and productivity information;
- A system based on sound and robust concepts;
- An industry standard, providing benchmark productivity information for all research e.g. sustainability;
- Ensuring all important information is captured and ordered into a logical format;
- A verifiable and transparent approach;
- Providing a framework for planning of research trials, PSPs and G & Y modelling and
- Presenting a “state-of-the-art” knowledge base.

Progress so far

Colin and Richard together with ICFR’s Trevor Morley and Robin Gardner have carried out much of the early work. The approach has been to classify the summer rainfall region into broad temperature classes based on mean annual temperature (MAT). Three temperature macro-zones have been identified, namely cool temperate (<16°C) warm temperate (16 - 19°C) and sub-tropical (19 - 22°C). These macro-zones correspond to general frost and snow risk (cool temperate), frost risk in hollows only (warm temperate) and frost-free (sub-tropical) categories. Each macro-zone is further subdivided into three temperature zones in increments of 1°C except for the lower range of temperatures (i.e. < 14°C). Since rainfall is closely related to forest productivity for a given temperature strata, each temperature zone was subdivided into three mean annual precipitation (MAP) categories corresponding to low, moderate and high MAP. Since evaporation rates vary with temperature, MAP thresholds decrease for each category with decreasing temperature. An important feature of the work was defining an altitude vs. MAT relationship for each of the eleven forest economic zones. Growth information for the study was compiled from numerous ICFR research trials and from PSP data supplied by the Modelling Mensuration Research Consortium (MMRC).

The classification has resulted in two outputs:
- Optimum growth criteria for commercial forestry species grown in the summer rainfall region of South Africa linked to a site classification based on climate, and
- Productivity estimates related to a site classification based on climate.

Species niches have been defined for 25 hardwood and softwood species related to the site classification. Climatic and related disease limitations have also been defined. To date, productivity information such as inter alia site index and maximum mean annual increment have been evaluated for each classification strata for nine species. Work has already begun on a quantitative description of the datasets making up the base data for the classification, so that site-specific models can be linked to the classification.

Demonstration of the ICFR Forest Productivity Toolbox

After detailed discussion on the progress to date and future work to be addressed, Richard gave a presentation of the ICFR Forest Productivity Toolbox which incorporates elements of the site classification. The members of the FSCWG were each given a copy of the Toolbox for evaluation before a general version of the product is released to ICFR sponsors. All agreed that the meeting was a success and that considerable progress has been made in a subject left on the “back-burner” for too long. The products of the working group should become available to all ICFR sponsors in the near future.

Contact: Richard Kunz (richard@icfr.unp.ac.za) or Colin Smith (colin@icfr.unp.ac.za)

ICFR gets access to the latest GIS software technology

L-R Clive Jackson (ITEd, UND); Andrew Simpson; Dr Fethi Ahmed (Geography, UNP); Chris Byren (GIMS); Frank Sokolic (Geography, UND); Richard Kunz (ICFR).

In May 2003, the University of Natal signed a site license agreement with the Environmental Systems Research Institute (ESRI), entitling it to use the GIS software produced by the company. The university, the third in southern Africa to join the US-based ESRI university license program, will reap widespread benefits through this agreement, which provides unlimited access to all ESRI desktop software products for version 3 and 8. In addition there are an agreed upon number of ArcInfo, Erdas, ArcSDE and ArcIMS licenses. The agreement also provides for unrestricted access to other related products such as MapObjects and ArcPad.

The need for a university-wide licence was realised by a number of individuals, and a technical sub-committee which included Richard Kunz (ICFR), Andrew Simpson (UNP) and Frank Sokolic (UND) assessed user needs across the Durban and Pietermaritzburg campuses and associated institutes. Successful motivation of the need for such a licence to the university’s Information Technology Division, resulted in an agreement being brokered with ESRI.

The ICFR is one of the largest users of ESRI’s software products on campus and therefore will benefit greatly from the site license agreement. All staff now have access to GIS software which was not feasible in the past, owing to the high costs involved. This means that staff can better utilise the spatial information stored in house. The site license agreement also ensures that the ICFR benefits from the latest advances in GIS software technology ensuring compatibility with software used by its sponsor organisations and facilitating continued exchange of spatial data and information.

In providing assistance to brokering the agreement, the ICFR recognises both the importance and the need for providing its staff with efficient access to relevant data and information, in order to improve the quality of research undertaken at the Institute.

This has been further supplemented by the recent purchase of a new A3/A4 colour laser printer which will improve the quality of output produced.

Contact: Richard Kunz (richard@icfr.unp.ac.za)
Plantation forest sustainability in Zululand

This trial, located near Kwambonambi on Mondi property, forms part of a series of trials in ICFR’s plantation forestry sustainability project. One of the issues under investigation is the long-term effects of repeated burning on site quality and productivity as well as the effects of vegetation management over successive rotations.

In the first rotation, the response of Eucalyptus grandis x E. camaldulensis (GC 540) to weed control and slash residue management practices was tested. This rotation was clear-felled in February this year (final results from this trial are in preparation) and the second rotation (2R) was re-established in April, with the same clone. The treatments that have been re-imposed are:

1. Slash burned, weed-free
2. Slash burned, weedy
3. No burn, weed-free
4. No burn, weedy
5. Coppice (additional control)

With the exception of the additional coppice controls, all treatments occurred on the same plots as in previous rotations (Figure 1). Considerable co-operation, planning, sampling, measuring, assessing and silvicultural operations were required for the re-establishment of this trial and the following with respect to the chain of events is worth noting:

Prior To Clear-Felling

Cover abundance and bio-diversity of vegetation were assessed in all plots, and samples were taken for biomass determination and nutrient analysis. Diameters and heights of all trees in the trial were measured, and forty trees were felled, covering a range of diameters, for volume determination and the testing of wood properties.

After Felling

Slash samples were taken for nutrient analysis. Firebreaks were prepared around the “burn” treatment plots and the slash in the brush lines was evenly spread in the remainder of the trial. The “burn” treatments were then burned and immediately afterwards further soil and slash samples were taken. The trial was then pitted at the same spacing as the previous stand and planted in April 2003. The trial is now well established and to date, with good winter rainfall, there has been negligible mortality.

Propagation of E. grandis x E. camaldulensis clone

A number of difficulties were encountered in obtaining cuttings for the re-establishment of the trial. These include:

- The clone no longer being in production;
- Finding recently felled trees (of the same type) and ensuring the stumps were not treated with herbicides when felled;
- Waiting for coppice growth and then taking cuttings (hit and miss as to whether or not good rooting was obtained);
- Herbicide drift onto coppice when spraying adjacent stands;
- Poor weather resulting in planting delays.

This has been a real team effort and the establishment of this trial would not have been possible without the assistance and cooperation of the following individuals: Ian Harrison, Gerson Ndangangeni and Phillip Cox (Mondi Forests); Ticky van Eeden (Harvesting Contractor); Justin Osborne (Silviculture Contractor); Athol Arbuthnot (Mondi Kraft); Mark Dougherty (Nseleni Nursery) and Ben Mutuanene and Wynand de Swardt (Sappi Nursery at Kwambonambi).

Contact: Denis Oscoft (Oscroft@absamail.co.za) or Keith Little (keith@icfr.unp.ac.za)

Funding for Loading Accreditation Programme

FESA has been successful in securing R720 000 from the Sector Partnership Fund and R300 000 from Forestry South Africa (FSA) for the Loading Accreditation Programme. Through FESA’s current Overloading Programme, the timber industry (pulpwood) has a self-regulating mechanism whereby industry players are accountable to one another on the issue of overloading. By taking this initiative one step further, FESA aims to work in conjunction with the National Productivity Institute (NPI), CSIR, South African National Roads Agency Ltd (SANRAL), National Department of Transport (NDoT), and Crackmay & Associates to develop a system whereby sound corporate governance will be rewarded through accreditations of hauliers, consignees and consignors.

The National Department of Transport is determined to address the problem of overloading. New legislation currently before Parliament will significantly boost the ability of the courts to deal with habitual overloaded and thereby raise the penalties for those found guilty. They are also considering a means of making some overloading control mandatory in all contracts. It is therefore crucial for the timber industry to be proactive in developing an overloading strategy, and not be caught by a system that does not suit it. This self-assessing initiative will further provide the opportunity to approach the NDoT for concessions.

Contact: Francois Oberholzer (francois@icfr.unp.ac.za)
Regular reports are received of black wattle trees grown from seedlings being unstable and falling over, especially after wind. Seedling containers in the nursery are raised above the ground, resulting in the roots being air pruned and thereby producing seedlings with root systems confined to the space available in the container. Depending on the length of time the seedlings are kept in the nursery, the root system becomes more or less pot bound. It is thought that this influences the type of root system that develops after planting in the field and hence the tree’s stability.

At the end of April 2002 a replicated trial was established at Bloemendal, using black wattle seedlings of four different ages. Seedlings used for the trial were sown in August 2001 (nine months), December 2001 (five months), January 2002 (four months) and February 2002 (three months). At the time of planting, the mass of the different root systems and their rooting capacity over 45 days in vermiculite, was determined (ICFR News, November 2002). Initial indications were that four-month-old seedlings were the most promising.

In June 2003, when the trees were 13 months old, three random trees from each treatment in one replication reserved for destructive sampling, were dug up. Two trees resulting from natural regeneration in the trial site were also dug up for comparison. The number of roots per tree was counted, and the presence of a taproot together with root distribution around the stem recorded. Photographs of the root systems were taken (Figures 1 and 2), the heights of all the trees in the remaining 5 replications were measured at the same time and blown trees noted (Table 1). From the results it was noted that all the trees had very shallow root systems. In all cases, except for the naturally germinated trees, a taproot was absent. While digging up the trees, it was observed that, once the lateral roots were cut, the trees were pulled up very easily. Therefore, should any damage occur to the root system in the field, trees could fall over with the slightest wind. Trees from natural regeneration had a strong taproot but few laterals. The anchorage of these trees was much better and greater effort was required to remove them from the ground. There was little difference in the number of roots between trees originating from different age classes at planting. In most cases the roots were not evenly spaced around the stem. Signs of the so-called “ball and socket” development of the roots at the base of the stem were evident in some cases in all seedling age classes.

The implication of these results is that, regardless of seedling age at planting, taproot development is adversely affected by the container and the taproot does not develop again, at least not during the early life of the tree. Whether roots will send down any sinkers at a later stage requires further investigation.

The trees from four-month-old seedlings were the tallest and on average had the most number of roots per tree. Whether there is any practical significance in this result needs to be tested in future measurements and observations on tree growth and stability.

Contact: Sieg Hagedorn (sieg@icfr.unp.ac.za)

<table>
<thead>
<tr>
<th>Mean height (m)</th>
<th>No. blown</th>
<th>Mean no. of roots</th>
<th>Range</th>
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<td>4.66</td>
<td>3</td>
<td>9 - 7 11</td>
</tr>
<tr>
<td>December sowing</td>
<td>4.89</td>
<td>7</td>
<td>13 - 9 19</td>
</tr>
<tr>
<td>January sowing</td>
<td>5.16</td>
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<td>13.3 - 9 19</td>
</tr>
<tr>
<td>February sowing</td>
<td>5.07</td>
<td>7</td>
<td>9 - 5 13</td>
</tr>
</tbody>
</table>

Table 1. Mean height, number of blown trees and root formation of one-year-old trees resulting from seedlings of different age at planting.

Figure 1. Root system of a tree resulting from a 4-month-old seedling (January 2002).

Figure 2. Tap root of a tree resulting from natural regeneration.

Latest ICFR bulletins

03-2003 A summary of cold tolerant eucalypt species grown in South Africa.
T-L Swain & RAW Gardner (In print)

04-2003 Removal of exotic woody vegetation from a riparian area: Results from a short-term management trial.
KM Little, CA Rolando & WD Lotter

05-2003 The effect of site preparation and vegetation control on survival, growth and nutrition during re-establishment of Pinus patula.
CA Rolando, KM Little, B du Toit & CW Smith

06-2003 First year height measurements of Eucalyptus henryi and E. longirostrata provenance trials in Zululand.
T-L Swain & D Oscroft

07-2003 Estimating the leaf area index of black wattle (Acacia mearnsii) from Landsat ETM+ satellite imagery.
ST Ghebremicael, FB Ahmed & CW Smith
The impact of burning intensity on maturing *Pinus patula* under-canopy vegetation growth

In maturing stands, pine needles and woody material decompose slowly at the cooler, higher altitudes, often resulting in an accumulation of litter. Besides posing a wild fire hazard, this litter layer can have important implications in terms of nutrient cycling, both of which can affect the potential productivity of the stand. One way to prevent the accumulation of litter is to burn it under controlled conditions. A study was carried out by Theresa Bird to investigate the impact of different burning intensities on litter load, nutrient cycling and productivity of a 17-year old *Pinus patula* stand in the New Scotland area of the Mpumalanga Highveld. For this experiment, the fuel load remained constant, whereas the fire intensity was manipulated by burning under different environmental conditions. For example, burning on a cool, humid day with a light wind resulted in a low intensity burn, whereas burning on a hot, dry day with a strong wind generated a high intensity burn. The three burning intensities tested were “high”, “medium” and “low”. These were compared to control plots where the litter was not burned. A full report relating to the tree growth from these treatments is available from Theresa Bird (terri@science.org.za).

In general, the presence of litter in unburned stands may prevent the germination and/or growth of existing and incoming weed seeds. The removal of this physical and chemical barrier (as during burning) may result in the seed germination that would otherwise not have occurred. Additional germination may also occur, especially for those species relying on the by-products of fire to break dormancy. Although weed growth following burning was not expected to result in tree growth suppression, this trial did offer the ideal opportunity to assess the above principles.

The various plots were burned during the winter of 1999 (May to June). Vegetation growth was assessed at the end of the growing season (April) of 2001 and 2002. Assessments included the identification of weed species present (Table 1), percentage cover, density and biomass. Although individual species data is available, treatment means for the April 2002 assessment are presented for the categories of perennial weeds (woody), herbaceous (annual) broadleaves (broadleaves) and grasses.

The percentage weed cover, density and biomass was highest in the “high-burned” treatments, followed by “medium”, “low” and no-burn treatments (Figures 1, 2 and 3). Most of vegetation consisted of woody weeds (37 % in the high-burn treatment) of which 65 % were pine regeneration. Herbaceous broadleaves and grasses contributed very little in terms of percentage cover. Woody weeds were the most abundant of all the species contributing 60 plants m$^{-2}$

<table>
<thead>
<tr>
<th>Woody</th>
<th>Herbaceous broadleaves</th>
<th>Grasses</th>
<th>Other species</th>
</tr>
</thead>
<tbody>
<tr>
<td>pine regeneration</td>
<td>Bidens pilosa</td>
<td>grass sp.</td>
<td></td>
</tr>
<tr>
<td>Acacia mearnsii</td>
<td>Conyza sumatrensis</td>
<td>Senecio sp.</td>
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<td>Phytolacca octandra</td>
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<td>Cheilanthes viridis</td>
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<tr>
<td></td>
<td></td>
<td>Pygmaeothamnus sp.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Rhus dentata</td>
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</table>

![Figure 1. Percentage weed cover determined from 9 x 9 m² sample plots. Lines on the bars indicate the standard error. (Broadleaves and grasses contributed very little in terms of overall percentage cover).](image1)

![Figure 2. Weed density determined from 18 x 1 m² sample plots. Lines on the bars indicate the standard error. (Broadleaves and grasses contributed very little in terms of plant density).](image2)

![Figure 3. Weed biomass determined from 9 x 1 m² sample plots. Lines on the bars indicate standard error.](image3)

for the high-burn treatment. More than half the woody weeds consisted of pine regeneration. The highest biomass was recorded in the high-burn treatment with a mean of 1017 kg ha$^{-1}$.

Although these assessments confirm that burning results in the germination and development of weeds, the slow development of the weed biomass would mean that it is unlikely that any interspecific competition will occur. With time, the recovery of the tree crown in the high-burn treatment would also mean that light would again become a limiting factor in the continued development of existing weeds or in the development of subsequent weed growth.

Contact: Gert van den Berg (gert@icfr.unp.ac.za) or Keith Little (keith@icfr.unp.ac.za)
This issue of ICFR News focuses on the research undertaken by the Plantation Re-establishment Research Programme at the ICFR consisting of four main projects: Vegetation Management Research (eucalypt, pine and wattle); Coppice Management Research; Ecophysiological Regeneration Research (pine and eucalypt) and Long-term Sustainability Research.

Vegetation Management Research

The objectives of this project are: “to develop commercially applicable, cost effective, environmentally sound and robust recommendations for vegetation management in commercial tree plantations, to match a range of sites and management options”. Although all research carried out strives to fulful these objectives, the broad concepts of sustainable management, yield optimisation and integrated vegetation management have been embraced and, as such, they form an integral part of any recommendations emanating from this project.

Currently there are two main focus areas; adaptive vegetation management research which deals with the testing of hypotheses as well as the interaction between vegetation and trees on a site-specific basis, while commercial deployment of weed control standards tests recommendations from research trials on a commercial basis.

In addition to justifying the need for vegetation management in terms of reduced mortality, increased uniformity, reduced time to canopy closure, increase yield, reduced rotation times, improved access and reduced fire hazard, research has also dealt with:
- the impact of intensive and selective vegetation control on tree growth;
- the impact of under-canopy vegetation on mature tree growth;
- the interaction between site type and vegetation control;
- the effect of vegetation management on pulp yield;
- the relationship between vegetation management and wood and pulping properties;
- mechanisms of intraspecific competition and tree development as a result of interspecific competition;
- timing of weed control operations;
- minimum weeding distances;
- ranking of treatments in terms of timber volume output and weed control costs;
- weed control under different site management practices;
- cover- and intercropping practices;
- testing of various herbicides, in the nursery, pot trials and in the field and
- the killing of single- and multiple-stem eucalypt cut stumps.

Although there are still many unknowns requiring investigation, research over the past 10 years has produced a wealth of information that has been of enormous benefit to ICFR’s sponsor companies. Besides the development of regional specific, commercially applicable vegetation management practices, the challenge for the future is to make this information available to the relevant end-users in such a way that it can be easily understood and is of practical use.

Coppice Management

Initial research in this area focused specifically on the management of Eucalyptus grandis coppice regeneration. With improved site-species matching and the introduction of new species or clonal hybrids, some of this original work has been revisited and new issues are being investigated. These include:
- coppicing potential of different Eucalyptus species;
- impact of different levels of stocking (stump and stem) on final volume;
- differences between coppiced and replanted stands;
- influence of different harvesting techniques on coppice regeneration;
- silviculture (weeding, fertilisation and timing of thinning operations) of coppiced stands;
- killing of Eucalyptus stumps;
- impact of uncontrolled secondary coppice re-growth on tree performance;
- optimum rates for chemical control of secondary coppice re-growth and
- highlighting of management factors aimed at enhancing coppice growth in weakly coppicing species.

Ecophysiological Regeneration Research

Prior to 2002, regeneration research at the ICFR looked at different methods of site preparation and more recently, on methods for improving Pinus patula survival when planted into slash. High levels of slash following harvesting make planting difficult and may potentially increase mortality rates. Burning is not always a solution as the Pinus species pathogen Rhizina undulata is associated with the burning of slash. Slash loads can be reduced mechanically although this is expensive and not always possible on all sites.

From past research it is known that mortality in softwoods, especially P. patula, is
unacceptably high. However, this research has concentrated on micro-climatic effects neglecting other important factors such as stress physiology, the role of water at planting and the impacts of pests and diseases. These factors, together with the impact of plant quality on survival and the relationship of results obtained to site, need investigating.

The project was established in September 2002 and aims to look at regeneration from a number of aspects including quantifying planting stress together with investigating the effects of environmental and physiographic factors conducive to post-planting stress. From this, silvicultural management practices will be developed to minimise stress and maximise survival and growth of planting stock. The role of pests and diseases on regeneration will also be further investigated in collaboration with the Forestry and Agricultural Biotechnology Institute (FABI) in Pretoria.

The research is also being expanded to include re-establishment issues associated with hardwood species. A five year project proposal is currently being prepared to present to Industry, in order to provide a framework for the research and prioritise the various projects.

**Long-term Sustainability Research**

The long-term effects of intensive silviculture on site quality and productivity are not yet fully understood, largely due to a lack of long-term (over many rotations) data. Recent emphasis in legislation on sustainable forest resource management means the effect of management practices on long-term site productivity and site quality need to be evaluated.

A number of trials were established by the ICFR from the late 1980’s through to the 1990’s, to examine the effects of various silvicultural practices on the growth of hardwoods. Although most of these trials were designed to provide answers to key questions over a single rotation, more can be gained from them should some of the treatments be re-implemented with each successive rotation. From this, growth data on the same site under alternative management practices can be obtained over several rotations, as can data pertaining to site characteristics and how these change over time.

Within this framework, issues such as repeated burning and/or various silvicultural practices (fertilisation, weed control or site preparation) can be assessed, as can comparison of the same genetic material over different rotations.

This project, known as the Plantation Forest Sustainability Initiative, aims to evaluate the effects of intensive silvicultural management on long-term site productivity. It involves the re-implementation of a number of trials across all ICFR programmes, measuring and monitoring key soil physical and chemical properties as well as growth and biomass parameters. Treatments and factors assessed will vary according to the principal objective of the original trial and the reason for re-implementation. Changes in soil nutrient levels and harvesting residues as well as yield will be monitored for each trial from rotation to rotation on the same treatment plots. In addition temperature and rainfall data for the sites will be recorded. To date three trials have been re-implemented, two to eucalypts and one to wattle.

Contact: Keith Little, (keith@icfr.unp.ac.za)
ICFR silvicultural research update in Sabie, Mpumalanga

Recently, the ICFR, together with partners from the forestry industry, hosted a field day in Sabie, Mpumalanga. The morning’s programme included indoor presentations by an excellent line-up of speakers. ICFR’s Carol Rolando presented results from research into the effect of site preparation and vegetation control on survival, growth and nutrition, during *Pinus patula* re-establishment. Keith Little, Programme Manager of the ICFR’s Re-establishment Research team, followed this up with a presentation on competitive interactions between grasses or broadleaves on early *Pinus greggii* growth, and both topics led to healthy discussion. John Chandler, from Masakhane Forestry Contractors, a silvicultural contractor to Komatiland Forests (KLF), then spoke about the “supply/apply” weed management system used by KLF, which gives contractors greater flexibility and responsibility than previously experienced. Kathleen Saunders of Working for Water in Nelspruit, concluded the session with an interesting presentation, both visually and technically, on the biological control of alien invasive species.

Moving from weed control to nutrition, Janine Campion (ICFR) presented an update on the recommendations for fertilising pines in the summer rainfall region, summarised in the ICFR Innovation 01-2003. The field day also provided ICFR’s Paul Viero with an opportunity to update the forestry industry on progress being made by the Pine Fusarium Working Group (PFWG), of which he is now chairman. Mike Kruger, representing the Seedling Grower’s Association of South Africa, also reported on the Nursery Accreditation Scheme currently being developed for *Fusarium*.

Correlations indicate that there is a strong relation between diameter under bark and height measurements at nine years of age, and that although bigger trees (in terms of diameter) have thicker bark, this bark is easier to remove than trees with thinner bark.

The group then moved out into the field to visit an establishment trial at Vlakkloof, looking at different growth responses between various treatments. Paul Viero (ICFR) also presented results from a trial at Melmoth where conditions were similar to those at Vlakkloof. The meeting ended with an excellent lunch sponsored by Central Timber Co-operative Ltd (CTC) and TWK Agriculture Ltd – many thanks to them!

Contact: Tammy Swain (tammy@icfrsabie.unp.ac.za)

Eucalyptus Interest Group meeting in Piet Retief

Earlier this year, a meeting of the Eucalypt Interest Group (EIG) was held at Lottenburg Edu-Farm at Piet Retief. A total of 51 people attended the meeting which included a field day comprising several indoor presentations followed by visits to trials in the area.

Keith Little (ICFR) delivered a topical presentation on “Coppicing of Cold Tolerant Eucalypt species”, recommending that it was more cost effective to coppice an existing crop, rather than to re-establish a new one, provided certain criteria are met. He highlighted the fact that stump mortality plays an important role in deciding whether or not to coppice, and whether improved genetic material can be introduced. The copice trials conducted showed which of the Eucalypt species grew well (but did not necessarily coppice well), which coppiced well (over 80% survival of stumps) and which grew and coppiced at acceptable levels. These results will enable foresters to decide on whether to coppice or replant certain species. New trials have been established which compare coppicing ability of a species with firstly, re-establishment of the same genetic material, and secondly, establishment of improved genetic material of the same species.

Brett Hurley of the Forestry and Agricultural Biotechnology Institute (FABI) in Pretoria, gave a presentation on entomology research at the Institute, including a synopsis of past work on *Gonipterus*. He indicated that possible future projects included investigating other bio-control agents, re-establishing the current control agent (*Anaphes nitens*) and studying the population dynamics of this species.

Tammy Swain (ICFR) presented results of final measurements of the second generation ICFR Eucalyptus macarthurii trials. These results show marked gains in the traits measured over the commercial control, namely a decrease in bark thickness of over 20%, an increase in ease of stripping and stem form by over 30% on average, and an increase in diameter under bark of 6 to 20%.

Contact: Tammy Swain (tammy@icfrsabie.unp.ac.za)

Latest ICFR Innovations

<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-2003</td>
<td>Updated recommendations for fertilisation of pine species in the summer rainfall region of southern Africa. (in print)</td>
</tr>
<tr>
<td>02-2003</td>
<td>Coppicing ability of 20 cold tolerant eucalypt species. (in print)</td>
</tr>
<tr>
<td>03-2003</td>
<td>Cold tolerant eucalypt species (CTEs) - A summary of information for site species matching and optimum growth.</td>
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Slash management and burning workshop

ICFR’s Forest Nutrition team recently convened a workshop in Nelspruit on slash and burning in South African plantation forests.

The event took place in conjunction with the Mpumalanga SAIF symposium on slash management and burning. Presentations delivered at the symposium provided an overview of the current situation with respect to slash burning as well as the current understanding of its effects on various ecological processes. This allowed the workshop to focus on two objectives. Firstly, to summarise problems associated with plantation slash and to explore various management options, and secondly, to identify knowledge gaps and formulate action plans to address these through research. All ICFR sponsors were asked to send representatives, and delegates from universities and technicians actively involved in forestry research, as well as fire consultants were also present. The workshop was well attended with enthusiastic participation. The first session looked at improving the understanding of slash characteristics and fire behaviour/risk. The need for reliable fuel models for South African commercial timber species and operating conditions was emphasised, with case studies demonstrating the principles of integrated fire management being presented. Fire intensity plays a critical role in the overall effects of fire on ecological sustainability. For this reason, the second session was designed to deal with understanding the use of fire at varying intensities and its environmental effects. Outputs from the workshop included a list of research and operational requirements that could assist in slash management, fire risk and integrated fire management. The major findings of the workshop have been summarised in an ICFR Bulletin and will be published shortly. These results will be incorporated in future research plans. The ICFR nutrition team wishes to thank all the participants for their enthusiastic support.

ICFR News – August 2003

Site-species interaction, Establishment & Land optimisation in Zululand

The ICFR / Zululand Interest Group meeting held in May covered a wide-range of topics from site-species interaction and establishment research through to land optimisation. More than 40 delegates from different forestry backgrounds (research, production, management, planning, etc) attended the meeting.

Robin Gardner (ICFR Forest Productivity Programme) presented results of six-year measurements in the site-species interaction trials SGE35 to SGE38 in Zululand. The main aim of these trials is to test the adaptability of promising new eucalypt species such as Eucalyptus henryi and E. longirostrata to hot, dry conditions in northern, coastal Zululand. Results confirm the exceptional drought tolerance of the two species, although E. henryi is clearly not as drought tolerant as E. longirostrata. The only other species showing potential in these trials are E. maculata, E. tereticornis and E. argophloia. An interesting feature of E. argophloia is that the species appears to be tolerant of a wide range of soil conditions, particularly those associated with melanic (black, clay) soils occurring in parts of Zululand. The three provenances of E. camaldulensis have failed to compete with any of the above species at any of the sites. As yet, little is known about the comparative fibre productivity of E. henryi and E. longirostrata. A report on this issue is currently being compiled using data from the 1992 series (SGE32 to SGE34) and is due to be published before the end of the year.

Later in the day the group were afforded the opportunity to visit to the ICFR E. henryi and E. longirostrata breeding seed orchards at Teza, where Denis Oscroft presented the results of the one-year height measurements. Much enthusiastic discussion ensued regarding the different thinning and topping options for eucalypt trees in Zululand breeding seedling orchards!

George Theart (Mondi Forests-Kraft Value Chain) gave a presentation describing the Land Optimisation Protocol (LOP) currently used by the SiyaQhubeka consortium in Zululand. The protocol, founded on the principles of Land Use Planning adopted from the sugarcane industry, includes aspects such as site-specific forestry planning, zonation, afforestation optimisation, mosaic afforestation planning, ecotone landscaping as well as various new ideas and technologies. Three main focus areas combine in the planning process, namely afforestation optimisation, logistical optimisation and financial optimisation, with integrated social and environmental considerations forming part of each.

This was followed by a visit to look at some of the results from this project. Rudolf Muller (Kwambonambi plantation, SQF) showed some of the recently constructed roads and bridges, and explained practical aspects of the project.

Finally Paul Viero (ICFR Plantation Re-establishment Research Programme) presented interim results for the Zululand Aqua-soil trials. Various factors were discussed including tree survival, ground level diameter, leaf surface index, biomass index and initial growth rate. The day ended with lunch at Lake Teza Tree House sponsored by Mondi Forests.

Contact: George Theart (george_theart@mondi.co.za)

Paul Viero (paul@icfr.unp.ac.za) or

Contact: Denis Oscroft (oscroft@absamail.co.za),

Paul Viero (paul@icfr.unp.ac.za) or

George Theart (george_theart@mondi.co.za)
The impact of *Cylindrocladium* in forestry of South Africa

*Cylindrocladium scoparium*, the type species of the genus *Cylindrocladium*, was first found on a dead pod of honey locust in 1892. Initially this fungus was considered to be saprophytic and was only proven pathogenic on roses 25 years after its discovery. Several more *Cylindrocladium* spp. have been found since and are associated with a wide range of disease problems in over 30 families of plants throughout the world. In forestry several *Cylindrocladium* spp. have been reported to cause severe damage to *Pinus* spp., *Eucalyptus* spp. and *Acacia* spp. both in plantations and nurseries worldwide.

In South African forestry, *Cylindrocladium* spp. are generally associated with disease problems in nurseries on *Eucalyptus* seedlings and cuttings and on *Acacia* seedlings. Some of the species reported in the past include *C. scoparium*, *C. colhounii*, *C. pauciramosum*, *C. ilicicola*, *C. candelabrum*, *C. gracile* and *C. ovatum*. Recent studies, however, showed that *C. scoparium* is restricted to North America and Europe and that the predominant species found on both *Eucalyptus* and *Acacia* spp. in South African forestry nurseries is *C. pauciramosum*. This pathogen has also been found responsible for plant losses during establishment.

The diseases caused by *C. pauciramosum* on *Eucalyptus* cuttings and seedlings in nurseries are cutting rot, damping-off, leaf spot, shoot blight, stem cankers and root disease. On *Acacia* seedlings, *C. pauciramosum* causes shoot blight, stem cankers and root disease. Most of these diseases develop during germination and growth of the plants, but can also cause problems during hardening-off, e.g. stem cankers on *Eucalyptus*.

Cutting rot, shoot blight and stem cankers caused by *C. pauciramosum* are characterized by blackened stems on which profuse, white sporulating structures (macroconidiophores) develop (Figure 1). From these structures the spores are splash dispersed by irrigation. *Cylindrocladium pauciramosum* is associated with three types of damping-off, namely pre- and post-emergence damping-off and top damping-off. Pre-emergence damping-off involves seedling death before seedlings emerge. Post-emergence damping-off consists of water-soaked girdling lesions at soil level, leading to seedling collapse. Top damping-off results from cotyledons retaining their seed coat for extended periods, from which the fungus infects the seedling. Leaf spots can vary according to the age of the host. Generally they first appear as water-soaked lesions becoming light to dark brown surrounded by a red or purple border. Shapes can differ from round to irregular and infections can easily spread to the stems. *Cylindrocladium* spp. are generally soil-borne pathogens and can be easily isolated from the roots of an infected plant. *Cylindrocladium pauciramosum* causes root disease of various *Eucalyptus* spp. and *Acacia mearnsii*. Infected roots usually become necrotic and discoloured, dying back towards the root crown, inducing yellowing of leaves.

*Cylindrocladium* spp. produce microsclerotia in soil and these act as survival structures in the absence of a suitable host. These structures enable the pathogens to survive in the soil for up to 15 years. This has lead to severe disease problems during establishment of various *Eucalyptus* spp. and *A. mearnsii* in plantations. *Cylindrocladium* spp. are capable of infecting newly established plants because free water is usually available during planting, and this moisture stimulates microsclerotia to germinate. Wounds are sometimes caused on the roots and lower stem during planting, and these facilitate infection by *Cylindrocladium* spp. Spores can then be splashed dispersed from the infected to healthy plants and can lead to disease epidemics in newly established plantation compartments.

Control of *Cylindrocladium* spp. on seedlings in forestry nurseries can be achieved by using fungicides in association with sound nursery practices, including immediate removal of diseased plants, use of new uninfected potting medium and minimal watering. Reducing the primary source of inoculum by using healthy shoots through selective and continuous shoot harvesting can control diseases that emerge during the rooting of cuttings. Dipping cuttings in a benomyl solution can further improve control but can lead to selection of benomyl-resistant strains. Active ingredients registered against *Cylindrocladium* spp. include mancozeb, benomyl, phytoactin L – 318, ferbam and prochloraz. Planting healthy plants and minimizing wounding through correct planting techniques can lead to control at establishment. Chemical treatments can also be applied in the field if economically viable.

*Figure 1*: *Cylindrocladium* sp. sporulating on infected *Eucalyptus* cutting. These structures are visible with the naked eye as white fungal growth, or with the use of a 10X hand lens.
It is well known to South African foresters that the Sirex woodwasp, *Sirex noctilio*, poses a serious threat to our pine plantations. Since the establishment of the Sirex Control Programme at the beginning of this year, significant progress has been made towards controlling this pest. One of the most important and urgent components of the strategy to control Sirex is the re-introduction and establishment of three biological control agents. These control agents have been previously introduced into South Africa, but have not spread with the woodwasp.

To ensure that the biological control agents become established, the Sirex Control Programme aims to re-introduce them on a large scale and on a yearly-basis. The first biological control agent to be re-introduced will be the nematode *Beddingia siricidicola*, which is the primary biological control agent of Sirex. The purchasing of the license from Australia to rear and release this nematode is in the final stages of approval. These nematodes will be mass reared at FABI (Forestry and Agricultural Biotechnology Institute), University of Pretoria, which houses the facilities and expertise to rear the nematode. FABI has already started to rear these nematodes and future shipments of nematodes from Australia will add to these numbers. The first inoculations of the nematodes into pine trees are planned for the first half of 2004.

Survey work is another important component of the strategy to control Sirex. This is needed to determine the distribution of Sirex in South Africa, which in turn influences the other components of the strategy, including the re-introduction of biological control agents. Workshops have been held throughout the country to increase the knowledge and awareness of Sirex within the forestry industry, particularly the means to detect its presence. Sirex pamphlets have been produced for the same purpose and will be distributed to those involved in pine forestry. The Sirex workshops and pamphlets will assist members of the industry in becoming more actively involved in conducting surveys and enhance the accuracy of records. The information contained in the pamphlet is available on the FABI Web pages (http://www.up.ac.za/academic/fabi) and hard copies can be obtained from Brett Hurley (email: brett.hurley@fabi.up.ac.za OR Cell: 082 909 3211).

**TPCP CONTACT DETAILS**

Website: http://www.up.ac.za/academic/fabi

Director: Prof. Michael J. Wingfield
Tel:012 420 3938/9 Email: mike.wingfield@fabi.up.ac.za
Manager: Field Services: Dr. Jolanda Roux
Tel:082 909 3202 or 012 420 3855 Email: jolanda.roux@fabi.up.ac.za
Manager: Diagnostic Services: Prof. Teresa Coutinho
Tel:012 420 3934/8/9 Email: teresa.coutinho@fabi.up.ac.za
Manager: Entomological Services: Mr Prem Govender
Tel:012 420 3938/9 Email: prem.govender@fabi.up.ac.za

FAX nr: 012 420 3960
Address: FABI, University of Pretoria, Pretoria, 0002

**Change of phone numbers**

Please note that the cellular phone numbers of Dr. Jolanda Roux (Manager of Field Services) and Mr Brett Hurley (Sirex Programme and Entomology) have changed as of June 2003. Jolanda’s new number is 082 909 3202 and Brett’s is 082 909 3211.
Southern African Institute of Forestry

The Southern African Institute of Forestry (SAIF) aims to represent the profession of forestry by promoting all aspects of forestry and improving standards of practice in the professional and technical aspects of forestry.

SAIF KZN

The recent Symposium hosted by the SAIF KZN Branch with regards to HIV/Aids and its effects on the South African Forestry Industry was a great success. More than 80 delegates attended, representing a broad spectrum of disciplines from both the forestry and non-forestry sectors. It is estimated that approximately 20 to 38 % of people residing in South Africa’s provinces are infected with HIV or suffering from full blown AIDS. Joop Steenkamp’s study on the infection of HIV/Aids among forestry contractors presented alarming statistics: North Eastern Cape 23 %, Mpumalanga 25 %, High Veld Area 38 %, Zululand 38 % and Midlands 40 %.

The branch has been successful in obtaining an education and training manual entitled “Implementing the ILO Code of Practice on HIV/AIDS and the world of work”, in disc form. A copy of this disk can be organised through SAIF KZN Branch (contact Lolly Stuart sc@futurenet.co.za) . The manual assists with identifying policy and procedures with respect to HIV/Aids for small, medium and large businesses. The committee would like to take this opportunity to thank sponsors for their commitment: Mondi, Sappi, NCT, Masonite and FSA.

At the recent monthly meeting, Mike Edwards, Executive Director of Forestry South Africa (FSA) delivered an informative talk, entitled “The Current and Future Role of FSA” dealing with the numerous challenges facing FSA. Current issues include the Biodiversity Bill, Property Rates Bill, Spoornet management and operation of their branch lines, proposed limits to road haulage mass and the Richards Bay toll gate, plans to address Sirex and Fusarium, forestry licensing issues, sectoral wage determination, THRIP funding, stream flow reduction activities, water charging mechanisms and invoicing, fuel tax refunds and tertiary education. Future initiatives that FSA plans to address include developing strategies for an industry-based approach to HIV/Aids, black empowerment and land reform and redistribution. In addition they will continue to build on their considerable successes in integrating forestry-related associations and lobbying for increased government support.

UPCOMING EVENTS: The SAIF KZN Branch will be holding a fundraising golf day for its members and the general Forestry Industry on Friday, 3rd October 2003. For more information please contact Trevor Marovich 083 638 0880 or Andrew McEwan 083 6765668.

In addition the Branch will be hosting a second Forestry Industry Symposium this year addressing ‘Major Threats Facing the SA Softwood Industry’. The proposed date is the 20th November (to be confirmed shortly). The programme will include the issues of Sirex, Fusarium as well as pine pulp round log prices, and is expected to be finalised by mid August.

Please refer to the Diary for information on upcoming monthly meetings.

SAIF Mpumalanga

In May, the Mpumalanga branch of the SAIF held a very successful symposium entitled “Slash management – a burning issue” in Nelspruit on 28 May. Over 80 people attended and the presentations, by a strong line-up of speakers, were interesting, topical and informative. This was followed by the national AGM and a cocktail party – a hard core of members stayed to the end and consumed the excellent red wine with enthusiasm!

Other events in the past few months have included various evening presentations at Misty Mountain, just outside Sabie. Pierre de Villiers presented a perspective on Yellowfish (very topical in a traditionally trout area) and Brian Leslie gave an informative talk on the Sawmilling Industry – both local and international.

SAIF MPU will be holding a Social Investment Awareness Day on 21 August at Hall’s Gateway in Nelspruit, the aim of this day being to provide information and create awareness of the social investment within forestry circles. Other upcoming events in Mpumalanga include the next Community and Forestry Initiative (CADI) meeting on 13 August, a tree identification course at the Botanical Gardens in Nelspruit in September and a talk on frogs by Jerry Theron in October. For more information on any of these events, contact Nikki Meinesz at niki@soft.co.za or 083 636 1060.

Editor: Sally J Uptold (MSc) sally@icfr.unp.ac.za

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by the Institute for Commercial Forestry Research (ICFR)
PO Box 100281
Scottsville, 3209
Pietermaritzburg
Tel: +27 (33) 386 2314
Fax: +27 (33) 386 8905
http://www.icfrnet.unp.ac.za

Diary of Events

AUGUST

5th ICFR talk by Dr Peter Sands (CSIRO)
Topic: Integrating determinants of growth into productive management
Venue: ICFR
Contact: sally@icfr.unp.ac.za

6th ICFR Board of Control meeting

7th ICFR / Zululand Interest Grp field day
Venue: Sappi offices, Kwambonambi
Contact: oscroft@absamail.co.za

11th SAIF KZN meeting at 17.30
Speaker: Rob Thompson, NCT
Topic: Durban chipping plant
Venue: NCT
Contact: craigs@nctforest.com

12th PFWG meeting & field day
Venue: White River, Mpumalanga
Contact: paul@icfr.unp.ac.za

13th ICFR / FESA Workshop
Topic: Harvesting impacts & sustainability
Venue: ICFR
Contact: colin@icfr.unp.ac.za

19th SAIF Council meeting
Contact: forestry@mweb.co.za

21st SAIF MPU meeting
Theme: Social Investment Awareness
Venue: Mpu Parksboard, Nelspruit
Contact: nikki@icfrsabie.unp.ac.za

SEPTEMBER

8th SAIF KZN meeting at 17.30
Speaker: Dave Hutton, Stihl
Topic: visit to new Pmb factory
Contact: craigs@nctforest.com

25th ICFR Eucalypt and Pine Steering Committee
Venue: ICFR

OCTOBER

3rd Mondi Silviculture Forum
Venue: Nelspruit
Contact: marius du_plessis@mondi.co.za

3rd SAIF MPU Golf Day
Venue: Harden Heights, Dalton
Contact: Andrew McEwan (083 676 5668)
or Trevor Marovich (083 638 0880)

7th Seed Orchard Research WG meeting
Venue: ICFR
Contact: tammy@icfrsabie.unp.ac.za

7th Eucalypt Interest Grp meeting
Venue: Harden Heights, Dalton
Contact: tammy@icfrsabie.unp.ac.za

8th ICFR Midlands Interest Grp field day
Venue: Eston
Contact: keith@icfr.unp.ac.za

13th SAIF MPU meeting
Venue & Topic: tbc
Contact: craigs@nctforest.com

14th ICFR Mpumalanga field day
Venue: Highveld/Sabie area
Theme: Harvesting & extraction
Contact: tammy@icfrsabie.unp.ac.za

17th Wildlife Interest Grp meeting
Venue: UCL, Dalton
Contact: rob@icfr.unp.ac.za

ICFR News – August 2003