ICFR MPUMALANGA INTEREST GROUP
FIELD DAY

Date: Tuesday 8 April 2007
Venue: Sabie Country Club, Sabie
Time: 08h00 for 08h30

PROGRAMME

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<td>Advantages of under-canopy burning – A KLF perspective</td>
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<td>KLF</td>
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<td>11h05</td>
<td>The new ICFR web site</td>
<td>Sally Upfold</td>
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<td>11h25</td>
<td>Travel to first field stop Longridge plantation</td>
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<td>Erosion control after intense wild fire</td>
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<td>12h20</td>
<td>Travel to second field stop near Klipkraal dam</td>
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<td>12h50</td>
<td>Pitch canker in mature pines</td>
<td>Jolanda Roux</td>
<td>FABI</td>
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<td>13h20</td>
<td>Lunch at Klipkraal dam kindly sponsored by York Timber</td>
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The effect of different methods of harvest residue management on pit quality during pine re-establishment

Carol Rolando
(carol.rolando@icfr.ukzn.ac.za)
Institute for Commercial Forestry Research, PO Box 100281, Scottsville 3209

Introduction
Following the harvesting of mature pine plantations, the remaining residues (slash) may be broadcast (spread out across the site), burned, windrowed or chopper-rolled. In re-establishment trials with *Pinus patula*, the method of slash management has been shown to be one of the factors that potentially contributes to early mortality. However, results to date are somewhat inconclusive. Some research has shown that in areas where the slash has been broadcast there can be an increase in mortality, particularly during summer (Morris, 1990; Allan and Higgs, 2000). Other studies have found no relationship between the presence of slash and mortality (Rolando and Little, 2004; Rolando and Little, 2005). High mortality in areas where the slash has been burned is often due to pests and diseases, particularly the pathogen *Rhizina undulata* (Atkinson, 1997). In addition to the above, there may be other factors that we are not currently measuring, that cause mortality under different methods of slash management. For example, the presence of slash may physically hinder the ability to prepare a pit resulting in a smaller and (or) poorly prepared pit. If the presence of slash affects access to the pits, the seedlings may be “shallow planted” or poorly placed into the pit. Organic material incorporated into the pits during pit preparation could also negatively affect root to soil contact following planting resulting in air pockets and reduced water uptake shortly after planting.

Observations made at recently pitted pine compartments, where the slash was broadcast, indicated that pits surrounded by lower levels of slash were bigger and contained more soil than those surrounded by high levels of slash. This, together with observations made in previous research, highlighted a need to investigate the effect of method of slash management on the size and quality of pits in an operational environment.

A pilot survey was conducted at four sites primarily to assess:

1. The effect of various methods of slash management on pit size and size variability, and
2. The effect of various methods of slash management on the amount of organic matter (litter) incorporated into the pits.

A secondary objective of the study was to assess whether either of these factors could be related to seedling mortality.

Description of survey
The survey was conducted on four recently harvested sites (A₁, A₂, B, C) located on three different plantations in the KwaZulu-Natal Midlands. The method of slash management differed at each site and included slash that was broadcast (A₁, B), chopper-rolled (A₂) or burned (C). Three sub-plots of 45 pits (3 rows of 15 trees) were laid out at each site and intensive measurements of each pit and the surrounding slash were made. These included assessments of:

- The width and depth of the pits;
- The distance of the slash from the edge of the pit;
- The height and composition of the slash (percentage cover of needles, branches and logs) surrounding the pits; and
- The quality of the pits (friability of the soil and amount of organic matter included in the pit).

All sites were planted to *P. patula*. Measurements of seedling height (ht in cm) and groundline diameter (gld in mm) were made shortly after planting, and survival was assessed at three months. A small study was also conducted to determine the approximate volume of pits. All data were summarised using summary statistics and regression.
Results

Assessments of pits

- The average depth and width of the pits at all sites was similar and ranged between 17 to 22 cm and 25 to 29 cm respectively, with an estimated mean volume of between 4.0 to 6.5 litres (Figure 1).
- Where slash was broadcast; pit size variability was slightly greater, depth was found to be a function of width and there was a greater number of small/undersize pits than in the burned compartment. This may highlight the need for better quality control of pit depth in areas with broadcast slash.
- The proximity of slash to the pit, rather than the height of the slash was found to affect the volume of the pit in areas with broadcast slash.
- Both the height of the slash and its proximity to the pit affected the amount of organic matter in the pit.

Assessments of seedlings

- Three month survival at all of the sites was below the commercially acceptable level of 90%.
- Seedling survival could not be related to any of the measurements pit size, quality or method of slash management.
- Other factors such as seedling size, poor planting and cut-worm damage were likely causes of mortality.

Take home point

Variability in pit size in this study increased where the slash was broadcast and was likely a function of the proximity of the slash to the pitting position. The most important parameter in this regard was pit depth. It is important that pit depth is not compromised in areas with broadcast slash as this could facilitate poor planting. Ensuring that the area around the pit is cleared of slash could help to improve pit uniformity in terms of depth, as well as reduce the amount of litter that may be incorporated into the planting hole during planting.

References

Sirex in South Africa – the status of the threat and its control

Philip Croft
philip.croft@icfr.ukzn.ac.za
Institute for Commercial Forestry Research, P O Box 100281 Scottsville, 3209

This presentation serves to raise awareness around Sirex and discuss the latest operational activities within the South African Sirex Control Programme (SASCP).

Issues covered in the presentation include:
• Introduction to the Sirex
• The Insect - Identification
• Tree mortality
• Where is Sirex now?
• Bio Control developments in South Africa
• Inoculation results 2006 / 7
• Sirex Trap results
• Trap Tree Trial
• 2008 Programme

Identifying Sirex
Damage to pine compartments results in financial loss and fibre or timber loss to the Industry. How do we know if the damage is caused by Sirex, i.e. how do we know if a trees is Sirex-infected? The first symptom to look for is a brown crown during February to June. Secondly, look for resin droplets on the tree where the wasp laid her eggs. These droplets are distinct and visible, especially in pulpwood stands where they appear lower down the stem of the tree. Thirdly, look for wasp abdomen parts still attached to the tree where the female wasp laid her last egg before dying. The head and wings fall off leaving the ovipositor and abdomen stuck onto the tree. Lastly, cut into the tree to see if there are any larvae and tunnels. From July onwards, a yellow fungus is visible in the cross section of the tree usually with a tunnel through the centre of the fungal infection.

Biocontrol and Monitoring
There has been an improvement in the parasitism rate from around 5.5% in 2006 to 20% in inoculated logs and 10% natural spread of the nematodes in 2007.

Traps to assess the presence or absence of Sirex were spread around the country from Pietermaritzburg to Sabie and Swaziland. The Pietermaritzburg traps were set up to determine the effectiveness of the imported lure that was used. Sirex wasps were caught in these traps and at Vryheid, Nongoma and Kwambonambi.

A trap tree trial is currently in progress and the first assessments will be made in March 2008. This trial is designed to find a replacement herbicide for Dicamba which is not FSC approved in forestry conditions in South Africa. Dicamba is used in Australia to stress pine trees which attract the Sirex female. The wasp then lays her eggs in the trap tree, which is then inoculated with nematodes.

The focus in 2008 will be on inoculations to boost background parasitism levels and introduce nematodes into newly infested areas. The traps will again be set to determine the spread of Sirex during the 2008 flight season, and new trap trees will be created. Monitoring must continue annually to determine the spread of Sirex as well as the population density which can only be seen in the number of trees that die due to Sirex attack.

Should there be any queries please contact Philip Croft at Philip.croft@icfr.ukzn.ac.za, cell: 072 272 9326, or at the ICFR 033 386 2314.
The interaction of pit size x water quantity x method of application and their effect on the early survival and growth of eucalypts.

(a trial series)

Paul Viero

(paul.viero@icfr.ukzn.ac.za)

Institute for Commercial Forestry Research, PO Box 100281, Scottsville, 3209

Introduction:
A forestry planting operation typically includes marking, the preparation of a planting position and the planting of trees with or without water, all of which may impact on the successful re-establishment of both pines and eucalypts. For each of these operations there are a number of factors that will vary according to geographic location, company policy and individual understanding. Examples include the choice of pitting implement (hoe or pick), the dimension of the pit (depth and width) and soil type (which affects soil friability and soil water availability). Some companies advocate a “no water” policy; others will always plant with water, while others will schedule watering for times when planting conditions are considered sub-optimal (i.e. hot weather, dry conditions). Varying volumes of water are also applied during the planting operation (this is usually dependant on different species and can range from anything between 500 ml to 6 liters per pit) while in other instances only hydrogels are used. Planting techniques (placing of the plant) and methods of applying the water at planting also vary, with water either added to the planting hole immediately prior to planting the seedling, or after planting the seedling as a drench, or both. Due to the lack of eucalypt data related to the above aspects, three field trials were implemented in different climatic zones and soil types focusing primarily on the interaction between:

- optimum pit size,
- the amount of water to be applied to the pits, and
- the method of application of water to the pits.

Trial design and Treatments
All three trials are 3 x 2 x 3 factorials with 3 additional treatments:
- **Pit Size**
  - Small (notch) (15 x 20 x 20 cm)
  - Medium (25 x 30 x 25 cm)
  - Large (40 x 45 x 35 cm)
- **Water quantity**
  - 1 litre
  - 2 litres
- **Method of application**
  - Before
  - After
  - Half before and half after
- **Additional treatments**
  - Dry plant (medium sized pit)
  - Hydrogel (medium sized pit)
Table 1: Climatic and tree growth conditions for the three trials

<table>
<thead>
<tr>
<th>Region</th>
<th>Species planted</th>
<th>Alt. (m)</th>
<th>MAT (°C)</th>
<th>MAP (mm yr⁻¹)</th>
<th>Site class</th>
<th>Soil Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tzaneen</td>
<td>E. grandis</td>
<td>895</td>
<td>20.2</td>
<td>950</td>
<td>Warm temperate</td>
<td>1.7, sandy/clay/loam</td>
</tr>
<tr>
<td>Zululand</td>
<td>E. gxu</td>
<td>40</td>
<td>21.8</td>
<td>1145</td>
<td>Sub-tropical</td>
<td>0.1, sand</td>
</tr>
<tr>
<td>KZN Mid-</td>
<td>E. gxn</td>
<td>1350</td>
<td>15.8</td>
<td>934</td>
<td>Cool temperate</td>
<td>3.6, clay</td>
</tr>
</tbody>
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Figure 1: Tree survival for trial series at 12 months.

Figure 2: Tree growth for trial series at 12 months.
Take home points

**Tree survival for trial series at 12 months**

- Both the application of water and hydrogel (at planting) significantly enhanced overall tree survival compared to dry planting (exception Zululand).
- Overall survival for the Zululand trial was poor possibly as a result of season of planting and burning (sandblasting of plants occurred soon after planting).
- Due to very wet conditions at time of planting for Zululand, dry planting treatment performed well relative to water and hydrogel plantings.
- Using 5 litres of water per pit (Tzaneen control) resulted in significantly higher mortality than both the water and hydrogel treatments.

**Tree growth for trial series at 12 months**

- The application of water or hydrogel resulted in significantly better tree growth than the dry planting control (exception Zululand).
- Tree growth for the 5 Litre water treatment at Tzaneen produced comparable growth to that obtained for the water and hydrogel treatments.
- Clear difference in growth were recorded between the Boston (Cool temperate climate) and Tzaneen and Zululand sites (Warm Temperate and Sub-Tropical respectively).

**Pit size and timing of water application at 12 months**

(For KZN-Midlands/Boston trial only)

- Significantly better survival was obtained for planting into medium and small pits compared to large pits.
- Applying water in three different ways did not result in significant survival differences at 12 months however there were commercially notable distinctions (92% survival = before, 89% survival = ½ before ½ after and 86% survival = after or root drench).
- The application of a hydrogel and applying water before planting treatments produced the best overall survival for the trial (also within commercially accepted norms ~ 90%).
Prescribed burning under pine plantations – A KLF perspective

Ben Bothma
bbothma@klf.co.za
Komatiland Forests (Pty) Ltd

Up to 1995 the forest industry in South Africa lost on a 10 year average annually about 12 000ha per annum. Currently the industry is losing a 10 year average of 14 000ha per annum. Another worrying factor is that the so called “huge fires” is happening more frequently than ever before.

The Veld and Forest Fire Act 101 of 1998 do address fire prevention, but only require landowners to prepare firebreaks on boundaries (chapter 4 of the act). The Industry is thus only creating small belts around an ever increasing fuel load: a real time bomb waiting to go off!!!

The real situation is as follows:
There is an increasing demand for sawn timber as well as chips
The planted area in S.A. has decreased from 1 432 000ha to 1 340 000ha
The industry cannot afford to lose one more ha of trees

What the forest industry need is a paradigm shift….

Instead of concentrating on fire belts, all attention should be addressed to fuel load reduction. Research in this regard had been done since 1978, but was never applied by the industry, because of various reasons.

Komatiland Forests decided to follow this route and has burnt over 5 000ha effectively under pine trees since November 2007.

“People need to come to terms with the fact that fires had been part of our environment for millions of years and need to continue to be part of the environment. If they do so, then they should be able to realize that the use of fire as a land management tool is ESSENTIAL and not an option”

Dr. Kevin Tolhurst
1999
Prescribed Burning has in the past been neglected because:

- The Rhizinia undulata scare
- Foresters told about “bad effects” on nutrients
- Advocated it would be detrimental on future growth
  - Danger of smouldering
- Top Bras in general did not like it

**GOLDEN RULES DEVELOPED PAST NUMBER OF YEARS**

- Pinus patula and Pinus taeda younger than 12 yrs not to be burned
- Pinup elliottii can be burned from 11 yrs
- Clearfelling compartments to be burned two years before clear fell, because of decomposition process being accelerated
- There is a 1:6 flame to scorch height ratio – do not slash weeds before burn – this will increase scorch height

continue...
• Steep slopes and difficult topography to be burned either early in the morning or late in the afternoon.

• Burning should not take place if temp is 23 degrees or higher

• Burning stumps to be doused during same operation

• Pruning branches not to be left against tree stems

• Compartment edges exposed to prevailing winds should be burned two days after rain and the rest of the compartment later

Advantages for the Forester And The Environment

• The cost of fire protection can be brought down.
• The incidence of destructive crown fires reduced.
• Narrow fires breaks replaced by broad bands.
• Burning done under optimum conditions.
• Fuel load reduced, thus reducing risk of wild fires.
• Weed control improved, reducing amount of chemicals placed in the environment.
• Reduction of weeds lead to less water used and improved run-off.

Continue on next page
Advantages for the Forester And The Environment

- Removal of weeds encourage indigenous plants, especially grass, to return.
- Fire accelerates breakdown of matter, reduces risk of build up on forest floor and make nutrients more readily available to trees – optimizing yield of land.
- It is now possible to burn natural areas that could not be exposed to fire because of risk to plantations. The making of tracers on boundaries has now been negated with huge reduction in effort, cost and potential damage, eg. Erosion.
- Access to plantations improved dramatically.
- Opportunities for agro-forestry.

The industry should not try to re-invent the wheel – rather use the knowledge gained by scientists over the last decades and implement prescribed burning successfully. This is the only cost effective way to reduce fuel loads under pine canopies and thus reducing the risks of wild fires destroying not only our valuable plantations, but also lives.
Introducing users to the new ICFR website
www.icfr.ukzn.ac.za

Sally J Upfold
sally.upfold@icfr.ukzn.ac.za
Institute for Commercial Forestry Research, P O Box 100281, Scottsville, 3209

During 2007, the ICFR website was redesigned and developed with the objective of better meeting the needs of its target markets. These include ICFR members, the South African forestry community, the wider public, both local and overseas, and the ICFR staff. Our website, www.icfr.ukzn.ac.za serves as an effective communication tool for the ICFR, providing visitors with access to detailed information about the Institute.

The new site presents information about the ICFR, its in-house research programmes and projects, as well as collaborative initiatives. These include the three broad areas of research; Tree Improvement, Re-establishment Research and Sustainable Forest Productivity. The site is also home to the South African Sirex Control Programme and the Pine Fusarium Working Group. All ICFR staff are profiled on the site with information on their individual expertise and publication profiles. The aim of the new site is therefore to profile the ICFR to the general public, raising awareness of the technical expertise and broad research areas that characterise the Institute, and contributing towards ensuring it is recognised as a leading player in the field of applied forestry research.

Another key function of the site is to provide our members with electronic access to all ICFR publications. This is a restricted area of the site accessible through individual userid and password. Publications are listed according to type (e.g. Bulletin, Technical Note or Innovation, ICFR Newsletter, Annual Research Review and Field Guides) as well as by year of publication. Members can also search all publications using multiple keywords. Currently the site contains all publications from 2000 to 2007, and earlier publications are being added.

A further useful aspect of the site is the Diary of Events section which provides information regarding ICFR as well as other Forestry Industry events. Information such as programmes, relevant links and contact details can be easily accessed from the Home page.

The new site is only as useful as our target markets find it, and the ICFR is committed to continue developing and extending this valuable communication tool, and we welcome any feedback, comments and suggestions regarding the site.
Pitch canker disease of pines in South Africa

Jolanda Roux,
Tree Protection Co-operative Programme (TPCP), Forestry and Agricultural Biotechnology Institute (FABI), University of Pretoria, Pretoria
jolanda.roux@fabi.up.ac.za, www.fabinet.up.ac.za

In 2007, the first report of pitch canker on mature *Pinus radiata* in Tokai plantation in the Western Cape was published. The affected trees were between five and nine years of age and symptoms included resinous cankers on the main stems and branches, flagging of branches and shoot tip die-back. On later field trips to the Eastern Cape, 12 to 15-year-old *P. radiata* trees in the George area were noticed showing similar symptoms to those observed in Tokai. Similarly, *P. greggii* (Southern provenance) in the Ugie area also showed typical symptoms of pitch canker. Isolations from these trees, examination of cultures for morphological features and DNA sequence comparisons confirmed the presence of the pitch canker fungus, *Fusarium circinatum*, on mature trees in these areas.

The origin of the *F. circinatum* inoculum for the new outbreaks is not known, but insect transmission is suspected because the deodar weevil, *Pissodes nemorensis* was found at all sites. Research is currently underway to trace the source of these field infections. The majority of the affected compartments were those that had not undergone the prescribed thinning, indicating that the trees were affected by stress. However, detailed surveys and mapping of outbreaks are required to make useful conclusions regarding these worrying field outbreaks of pitch canker. Foresters are urged to monitor trees for symptoms of pitch canker and to report observations to the TPCP immediately.

The occurrence of *F. circinatum* on mature pine trees is of great concern. Not only does it threaten the productivity of plantations, but it also has implications for seed production in seed orchards. It is well known that the pitch canker pathogen is seed-borne and up until now, South African pine seed that has been screened has been free of *F. circinatum*. This is presumably because stem and cone infections are needed to result in seed being contaminated. With the first outbreaks of full-blown pitch canker in South Africa it has become more crucial for all forestry companies to prioritise the screening and selection of trees that are tolerant/resistant to infection by this pathogen. This will be the only sure means to avoid dramatic losses in the longer term.

**WE URGE ALL FORESTERS AND FARMERS TO PLEASE LET US KNOW IF YOU SEE ANY OF THE SYMPTOMS OF PITCH CANKER.**
Soil conservation after a major fire

Simon McNamara
Smcnamara@york.co.za
York Timbers Private Bag X518 Sabie 1260

1. Soil conservation after a major fire

- Where to begin?
  - Erosion index maps
    - Take slope, soil type and soil depth into account.
  - Drive and walk the burnt area
    - Severity of burnt area
  - Next to public roads (channeled run off)
  - Strategic sites like drinking water sources, roads that are damaged.
- What you see after the fire does change
- Use in situ material where possible
  - Rocks, logs.
- Bags with wood chip waste
  - Must be pegged down
- Gabions
  - Stretch money as far as you can
- Establish ground cover
  - E. Teff seed
  - Live with grasses, use selective herbicides for wattle etc.
- Monitor success/failure through photo’s
  - Go back and fix breached erosion walls.
  - Visit sensitive sites after each heavy downpour.

2. Manpower and costs

- Three major farms were seriously damaged
  - Rhenosterhoek, Longridge and Driekap.
  - A team per area
  - Team comprised of Supervisor, Truck driver, 20 to 30 labour, Labour truck.
- This became a short term job creation opportunity
  - Low skills required
  - Initial 6 month contracts in place.
  - Local community provided the labour.
- Consumables
  - Citrus bags, pegs, wood chips, grass seed.
- PPE
  - Overalls, boots, gloves.
- Productivity
  - Too many variables, so a manday rate covers the wages, and supervision ensures progress.
- Costs
  - Spent 820K in 6 months
  - Average workers wage R105/day (includes PPE, drivers, transport, supervision)
  - Wages 791K
  - Bags 17K
  - Seed 12K