



MAF/NZFOA 4th Annual Forest Health Workshop

Forest Diseases and Disorders: Current knowledge and best practice control measures

28th February – 1st March 2005 – Rotorua

Workshop Objectives

1. To review progress in forest biosecurity over the previous 12 months
2. To discuss strategy for the next 12 months – including FBRC research strategy
3. To provide an update on current disorders (plus pitch canker)
4. To determine where we need to prioritise effort in terms of control strategies as well as research strategies.

Summary from Workshop

Approximately 50 stakeholders attended the workshop. The workshop presentations have been placed on the FBRC website (www.fbrc.org.nz). Key points from the workshop follow:

- In the last 12 months industry, MAF, and researchers have made excellent progress addressing issues of forest health and biosecurity based on what we said we'd do at last year's workshop. Details are appended (Appendix 1).
- In particular we have made excellent progress expanding forest biosecurity capability and also addressing two key diseases: Pitch Canker and Nectria Flute Canker. Note – Pitch Canker is not in NZ and Nectria Flute Canker is currently confined to the lower South Island.
- The Forest Biosecurity Research Council (FBRC) has been established and the new draft Research Strategy was launched at the workshop. Participants and others have and are being asked for input. See the FBRC website for details (www.fbrc.org.nz).
- Pine pitch canker is still seen as a major threat to New Zealand forestry and we now have an FOA-funded post-doc, Dr Rebecca Ganley, working full time trying to improve our understanding of this disease. Her presentation on Pitch Canker – “What we know, what we don't know” is on the FBRC website.
- The pitch canker response plan is being updated and a simulation exercise is planned for May 2005.
- Nectria Flute Canker was a major “negative” raised last year, however, the Nectria Working Group, together with the FBRC and others have made significant progress addressing this issue. Dr Pat Crane has recently arrived from Canada to undertake a post-doc to better understand the ecology of this disease.
- Following on from a MAF review of forest health surveillance systems the FOA Forest Health Surveillance system has been redesigned for deployment in 2005. While not a focus of this workshop it is worth mentioning, as it was a key topic last year. A Forest Condition Monitoring System is currently being designed for implementation next year. This will become a part of the FHS system.
- The workshop provided an update on the key diseases and disorders currently causing economic damage in New Zealand. The presentations are on the FBRC website. **Perhaps the most concerning finding from the workshop is that despite the key diseases and disorders causing financial losses estimated to be in the order of \$200 million/year, with the exception of Dothistroma there are almost no operational responses and very little research effort directed at finding a response.**
- Breakout sessions dealt with current knowledge gaps around the current diseases and disorders and also looked at research priorities for next year, which will be considered by the FBRC Operating Plan. Key points from these sessions are covered in this report.
- A list of **Action Items** is included in this report.

Introduction

This was the fourth annual Forest Health workshop sponsored by FOA and MAF. The 50 attendees felt that the workshop was very worthwhile and encouraged a similar format for next year. However, the point was made that we should try to get more senior forest industry representatives to the workshop.

The focus of this year's workshop was on what we know and are doing about the current key diseases and disorders that are affecting radiata pine forests in New Zealand. Jeremy Fleming, as Chairman of the Forest Biosecurity Research Council (FBRC) presented information on FBRC and particularly on the new draft FBRC Research Strategy that sets out priorities for investing about \$19 million into forest biosecurity research over a five-year period. Workshop participants were asked to help set research priorities for next year, which will become part of the FBRC Operating Plan.

This report captures the highlights from the workshop and main points of discussion. A series of "action items" was developed that will be addressed over the next few months to a year.

Workshop Programme and Discussion

The programme for the workshop is copied below and key points of discussion noted. For copies of the presentations see the FBRC website www.fbrc.org.nz.

Monday evening sessions:

Opening Speech by the Honourable Jim Anderton – Minister of Forestry

- The minister made a very relevant point with regard to biosecurity funding, and that is that it is up to us as an industry, and particularly the forest biosecurity sub-sector, to lobby within industry and also Government to ensure we are allocated a reasonable sum of what was "FIFA" money for forest biosecurity purposes. This has become an Action item from the workshop.

Dealing with New Incursions – Pitch Canker as an Example

Rebecca Ganley (FOA-funded Post-doc) - Pitch canker as a threat to New Zealand. What we know; what we don't know.

- Beccy has been building up knowledge on pitch canker to determine how serious the disease might be should it establish in New Zealand.
- The "good news" is that we only have a few high risk factors, although many low risk ones.

- The bad news, of course is that we are High Risk because of the species that we grow (radiata is the most susceptible) and our relatively high foliar N levels, especially on ex-pasture soil.
- We need to urgently understand why pitch canker is such a problem in Spain and use this knowledge to try to reduce the risk to New Zealand.

Peter Thomson (Director Post-clearance, Biosecurity BNZ) – What if pitch canker does get here, what can we expect government and industry to do?

- Peter outlined the role of Biosecurity NZ and the expected response both from Government and industry.
- A key point is that MAF is planning to take a greater role in “pest management”.

Tuesday Session

Bill Dyck (for FOA) – What’s been achieved? A review of 2004 Workshop Outcomes and other forest health achievements over the last 12 months. (See appendix 1 for details).

Jeremy Fleming (Chairman FBRC) - FBRC – Progress, Launching the R&D Strategy, Development of Operating Plan:

- Key point – we’re looking for input on the draft FBRC strategy and on the FBRC Operating Plan for next year.

Key Diseases and Disorders (Peter Thomson – facilitator)

1. Nectria Flute Canker (G Hosking, P Oliver)

- While we know a great deal more about the disease than we used to there is still a lot we don’t know. For example, why do some trees get the disease before they are even pruned?
- There is a great deal of variability with the disease making it extremely difficult to predict.
- Having smaller branches, and therefore smaller pruning wounds is part of the management answer.
- The point was made that industry needs to have a plan for what to do the next time a fungus establishes in our plantations.
- **Operational response** at the current time is to try to manage pruning operations to reduce the incidence of the disease.
- Considerable research underway to address gaps but more effort required.

2. Dothistroma (R Ganley for R Bradshaw, L Bulman, D Hammond)

- NZ isolates of Dothistroma are genetically distinct. The sexual stage is not found in NZ, hence low genetic diversity. NZ isolates are extremely low in Dothistromin production compared to others (e.g., German isolate 50 times more production of the toxin).
- Many questions on Dothistroma that need to be answered. E.g., the impact of more virulent strains getting established in NZ; is Dothistromin a pathogenicity or virulence factor?
- Current control is copper spraying - same for last decade - low volume 5 litres spray/ha - between 1 and 1.6 kg/ha copper. Cost of chemical per ha is about \$11 but flying varies from \$10 to \$150/ha.
- Most seasons about 70,000 to 100,000 ha sprayed.
- An updated handbook is now available through NZFR1.
- Public perception will become more of a problem, particularly with certification pressures.
- Many things we don't know. E.g., Why Dothi isn't a problem in Coromandel forests, why radiata grows out of susceptibility by age 15.
- We have an **operational response** (spraying) but we don't have much research effort that is going to lead to new operational responses, other than breeding which is only a part of the answer (and a long-term one at best).

3. Armillaria (I Hood, R Hill, WY Wang)

- Two species *A. novae-zelandiae* and *limonea*. Armillaria causes about \$37 million of loss per year and little is done about it.
- We don't know how Armillaria spreads to 2nd rotation pine forests that didn't have Armillaria in the 1st rotation.
- Some biocontrol research going on. Have developed more resistant seedlings. Also work on stump biocontrol.
- Generally very little **operational response**.

4. Cyclaneusma (L Bulman, N Heron)

- *Cyclaneusma minus* causes about \$60 million/year of growth losses.
- Most severe in trees 6 to 15 years, but we don't understand why.
- The fungus is always present, but there is some trigger that causes it to become a pathogen.
- While thinning can remove the worst trees, there are other selection factors that means that operationally thinning doesn't really have an impact.
- Breeding could be a long-term solution, but more research could be done on spraying.
- Basically, there is no **operational response**.

5. Physiological Disorders (M Dick, S Anderson)

- This category includes UMCY (upper mid-crown yellowing) and PNB (physiological needle blight – sometimes incorrectly referred to as “Strasseria”).
- PNB causes extensive death of needles in trees over 12 years.
- Outbreaks are episodic but there is some correlation with high winter temperature and rainfall.
- Several knowledge gaps including the influence of tree age, mechanism of needle breakdown, relationship with heavy soils etc.
- Industry is aware that the problem has been getting worse over the last 5 years.
- There is no **operational response** to PNB.
- UMCY is caused by a nutritional imbalance between Mg and K and there is a significant genetic influence. However, severe UMCY doesn't mean poor growth as sometimes the reverse is true.
- There is no **operational response**.

Workshop Session

Questions addressed:

- Group 1 (G Hosking chairman) - focus on Dothi and Cyclaneusma - “Have we identified best practice for control? Is more research needed? Is more tech transfer needed? Elaborate.
- Group 2 (D Hammond chairman) - focus on Armillaria, Physiological disorders, and Nectria – “Have we identified best practice for control? Is more research needed? Is more tech transfer needed? Elaborate.
- Group 3 (W-Y Wang chairman) - focus on the FBRC Strategy - considering the 18 priority project areas - what are the key knowledge gaps that should be addressed within the next one or two years?

Report Back

Group 1 - “Have we identified best practice for control? Is more research needed? Is more tech transfer needed?”

Dothistroma

- Have we identified the need for control? A cost/benefit analysis seems to be required, as it seems we are not sure if we recover the cost of control over the life of the stand.

- It was recommended that we consider an international workshop focused on Dothi.
- There are several issues around monitoring. New technologies should be evaluated – e.g., hyperspectral. We need to look for the best technologies.
- We need to improve understanding of disease impacts on wood quality.
- We need to address the issues around PR of spraying, including formulations
- Tech transfer – Dothi handbook good but probably not that well known.
- Small block management – maybe don't bother spraying, other options to manage. FFA tech transfer exercise.
- Major gains to be made in spray technology/formulations etc. We need to continue to do it better

Cyclaneusma

- Compared to Dothi the answers are fuzzier; we need to be more specific.
- A guide on needlecast coming out; should include a field guide to management of the diseases.
- Tree breeding still need to be explored more. High priority to advance for both these diseases. What do the resistant breeds contribute?

Group 2 -“Have we identified best practice for control? Is more research needed? Is more tech transfer needed?”

Armillaria

- Stump removal might be the best biological practice but not economical
- Armillaria is not always perceived as a problem
- More work required on controls, including Trichoderma (small risk)
- But, can Trichoderma work on bareroot stock? Or, do we look at container stock for other advantages as well.
- Alternative species – have their own issues and research needs;
- Are higher stockings of radiata the answer?
- Forest managers need a better understanding of forest health
- Retention of institutional knowledge is critical for Armillaria and other issues to avoid making the same mistakes.
- Predicting Armillaria spread seen as a need.
- Technology transfer – a gap between science and practice – need for more popular articles and to get science published.
- Need to be able to model the impact of Armillaria and to look at options for management.

Physiological Disorders (no. 3 for group importance)

- Need for a full time focus; understand the basics; need for hard science.
- Might not have a management tool but might be able to at least communicate better.
- Need for better economic loss data.

Nectria

- Nectria needs a management solution; need answers to basic forest management questions
 - Wider industry needs to be more involved; more funding required.
 - Field guide needed
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Group 3 – “What are the key knowledge gaps that should be addressed within the next one or two years?”

Project Area: Management and control methods

- Alternative to aerial spray (e.g., for incursions)
- Monitor and control of nectria
- Management and control of wood borers
- Best practice guide of existing control measure for existing pests and diseases

Project Area: Detection technologies

- Focus on export logs – trade issue (e.g., Sirex – monitor populations at port)

Project Area: Molecular Diagnostic tools

- Key to retain capability
- Develop DNA database – to formulate tools later
- Develop DNA library – for diagnosis

Project Area: Identifying potential pest threats

- Check current database/list and update information
- Include threats to indigenous species

Project Area: Pest Impact Assessments – what’s out there?

- Target two impact studies per year
- International literature search to update list

Project Area: Taxonomic Keys

- Determine what we are missing
- Consider target of one major key per year

Project Area: Other Technologies

- Cost/benefit analysis of current technology – sniffers etc

Project Area: Biological Control

- Biological control and IPM strategy
- Control weeds
- Modelling biocontrol systems
- Shoot tip moth/spray control (with Chileans)
- Fungi – biological control technology

Project Area: Breeding

- Breeding company to be invited to join FBRC and contribute to strategy etc
- Determine heritability of radiata pine to existing diseases
- Cost/benefit
- Marker-assisted selection

Project Area: Treatment Technologies

- Fumigation gases
- Environmentally friendly dip (spray for logs)

Project Area: Pest Threats to Trading Partners

- Research by request of trading partner
- Monitor/record pests on logs

Project Area: Ecosystem Vulnerability

- Planting indigenous trees overseas to test their susceptibility to insects and disease.
- Establish baseline data – feeding etc.
- Shared pests of related indigenous species overseas

Action Items from Workshop (responsibility in brackets)

1. Industry and researchers need to make the case to both industry and minister for “FIFA” money for forest biosecurity (Urgent FHC, FBRC)
2. Industry and MAF needs to have a clear plan for what to do the next time a new fungus is detected in our plantations (FHC, MAF).
3. More effort is required to communicate to a wide audience the benefits from research and the returns to industry from operational spending to detect and control diseases (eg. forest health surveillance system) (FHC, FBRC)
4. Consider FHC involvement on Government review of Regional Biosecurity funding which is currently underway (FOA/FHC communication EW)
5. Consider inviting DOC to participate on FBRC (FBRC)
6. Consider inviting the Radiata Breeding Company to participate on FBRC (FBRC)
7. Consider input from workshop into FBRC Operating Plan as potential research priorities. Follow the process in the Strategy. (FBRC)
8. Consider holding an international workshop on Dothistroma knowledge and control options (FBRC)
9. There is a desperate need for stress physiology scientists to be involved in forest biosecurity research. Consider lobbying research organizations (such as NZFRI) to employ a stress physiologist who could work on biosecurity related topics or evaluate if Ensis Australia scientists could do the work. Would need to develop a work programme and support it (FBRC)
10. Additional to scientific research, seek operational control methods for existing diseases and disorders (e.g., can we effectively spray fungicide to treat *Cyclaneusma*?) (FOA/FHC)
11. Support the development of management tools for dealing with *Nectria* (FHC, FBRC, NWG)
12. Produce a workshop report and distribute to participants (BD)
13. Post presentations and report on FBRC website (BD) and link to FOA and MAF sites.
14. Get more FOA representatives to these workshops (FOA)
15. Plan a workshop for next year (FOA/MAF).

Appendix 1 – Achievements Since Last Year’s Workshop

1. Post workshop presentations to FOA website (FOA) ✓
2. Prepare and circulate workshop report to participants – identify action items (FOA) ✓
3. Include Action Items on FHRG agenda (FOA) ✓ - generally yes
4. FHC to develop a strategy to address nectria problem (JF) – and to address issues raised in DA presentation (FHC) ✓
5. MAF to publish draft surveillance review document (MAF) ✓
6. FOA to establish commitment to national forest condition monitoring scheme (FOA) ✓
7. FHRG to establish a contingency mechanism to support “unexpected” research needs. (FOA) – not officially but...
8. Update economic analysis and environmental impact for pitch canker (MAF) ✓
9. Source funding for pitch canker research gaps (FHRG) (and other gaps) ✓ post-doc on PC, other gaps being filled
10. Design a vector trapping/surveillance programme for pitch canker response - not done – insects no longer sent to FR for identification
11. Conduct a simulation exercise on PC in the next 12 months (MAF). – planned for May
12. Update the pitch canker contingency plan! (MAF) ✓ - in progress
13. Operationalise the plan. (MAF) – in progress
14. Develop an FHRG Strategy – based on feedback (FHRG) ✓
15. Formally establish FHRG (FOA) ✓
16. Formalise relationship with FHRC (FOA) and FHC (FOA) ✓
17. Communicate FHRG to stakeholders ✓
18. Identify trained forest biosecurity resource and training needs (FHC?) – for website – for action plans ✓
19. Communicate current projects to stakeholders (FR, CORE) ✓ - progressed
20. Investigate the development or customisation of an “e-learning” training system for forest health (BD) ✓ - progressed but expensive

Scorecard for last 12 months:

Improved awareness	B+
Collaboration	A
Tackling key issues	A
Filling gaps in biosecurity	B+
Improving surveillance	B+
Strategic approach to research	A-
Effective research	A-
Incursion response	A-