



# *Nectria* ecology summary March 2008

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- *Nectria* flute canker – a problem in *Pinus radiata* plantations
- Severe stem malformation & growth loss - 10% of some stands
- No breakdown in structural integrity of the wood
- Decay fungi may invade the dead sapwood
- *Nectria fuckeliana* associated with the cankers





1. How does the fungus spread and infect the host?
2. How does the host respond to the fungus?

# 1. DNA trial: *Comparing pruned and unpruned trees*



- Tod Ramsfield and Matt Power
- Hypothesis: *Nectria* enters trees through pruning wounds
- Methods:
  - ▶ Cores from 90 pruned and 90 unpruned trees (no flute cankers)
  - ▶ 4 sites, 3 forests
  - ▶ DNA extracted & PCR: 2006, 2007, 2008
  - ▶ Cultured: 2007, 2008

# 1. DNA trial: *Results*



- 2006: No significant difference between pruned and unpruned trees
- 2007: results (DNA and culturing) similar to 2006
- 2008: awaiting results

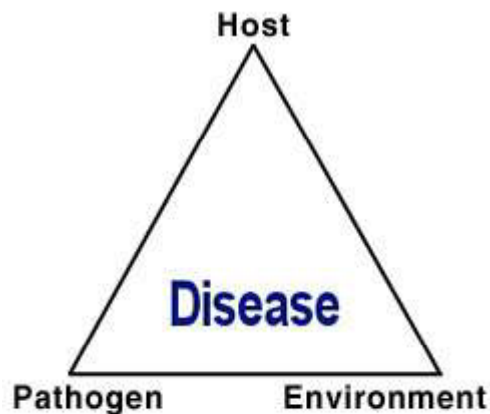
Pruning Status	Nectria present	Nectria absent	% present
Pruned	17	73	18.9
Un-Pruned	22	68	24.4

# 1. DNA trial: *Further work*



- *Nectria* can enter trees another way
- 2008 – destructive sampling of positive trial trees to find entry point
- **New trial:**  
Entry through bark cracks and branch crotches
- 45 trees
- Branches weighted and unweighted
- Inoculum source: conidia, ascospores, control.
- Assessed after 6, 12, 18 months

# 1. DNA trial: *Nectria flute canker* vs *N. fuckeliana*



from apsnet.org

- Role of pruning?
- Disease triangle
- Fluting much more common on pruned trees
- Pruning trials show more fluting in winter
- No record of an unpruned tree with fluting and perithecia
- Pruning changes tree conditions?
  - ▶ Stress
  - ▶ Drying out – whitewood

## 2. Wood quality: *Comparing internal and external defect*



- What effect does *Nectria* flute canker have on wood quality?
- How do external symptoms relate to internal defect?
- Are defect classes based on external symptoms accurate?
- How does disease severity relate to sawn board recovery and grading?

## 2. Wood quality: *Study 1: Young trees*



- Trees in pruned stub trial est. 2003 (City Forests)
- History of trees well known
- 10 trees in 3 severity classes: Low, Moderate, Severe
- Felled trees
- Mapped whorls and defect
- Destructively sampled
- Isolations
- Discs photographed and images analysed

## 2. Wood quality: *Results*



- Study 1-Young trees:
  - ▶ Despite obvious cankering - very little stained or symptomatic wood
  - ▶ *Nectria* only isolated from a few trees
  - ▶ Results of image analysis



## 2. Wood quality: *Study 2: Mid-Rotation Trees*



- Trees approaching harvest: 24 yo (City Forests)
- 12 trees in 4 severity classes: Nil, Low, Moderate, Severe
- Felled
- Mapped whorls and defect
- Destructively sampled
- Isolations
- Discs photographed and images analysed

## 2. Wood quality: *Results*



- Study 2-Mid-Rotation trees:
  - ▶ Infected trees had larger knotty core
  - ▶ Bark cracks often encased bark
  - ▶ Wide depressions often no internal defect
  - ▶ Results of image analysis
  - ▶ Further studies on larger scale



## 2. Wood quality: *Study 3: Sawing Study*



- Trees approaching harvest: 24 yo (Wenita)
- 30 trees in 3 severity classes: Low, Moderate, Severe
- Logs assessed at sawmill
- Kaituna method – assessed logs during sawing
- Board grade recovery analysed between severity classes
- Isolations



- Study 3 – Sawing:
  - ▶ Standing tree assessments & log assessments useful
  - ▶ Kaituna method good for quality monitoring
  - ▶ Trees small and knotty core large – difficult to compare recovery
  - ▶ New study with harvest-age trees





- Dispersal of different spore types
- Conditions for spore production
- Long-term survival of spores
- Mating types/fungal genetics
- Interaction of *Nectria* with pine resin
- Interactions between *Nectria* and (decay) fungi and other organisms
- Production of whitewood in host
- Pruning/management trials
- Host genetics



- Tod Ramsfield, Matt Power, Margaret Dick & Lindsay Bulman, FBP Scion
- Rod Brownlie, Dave Cown, Dave Pont, WQ Scion
- Peter Oliver & Ross Chambers, City Forests
- James McEwan, Paul Greaves, Aaron Gunn & contractors, Wenita
- David Orlovich & Mary Anne Miller, Otago University
- Nectria Focus Group