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Forest Biosecurity and Protection

***Nectria* ecology summary**

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CSIRO

SCION





- Flute canker – a problem in Southland & Otago.
- Discovered early-mid 1990s
- Severe stem malformation and growth loss.
- *Nectria fuckeliana* associated with the cankers.



- From Sweden, Denmark in spruce and fir.
- Infects pruning wounds but not considered harmful to wood quality (in spruce). Metzler, 1996.
- “Latent opportunistic pathogen”. Vasiliauskas, 2004.

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

1. Spread and infection: Spore Trapping

- ▶ Is there a correlation between spore release and environmental conditions?

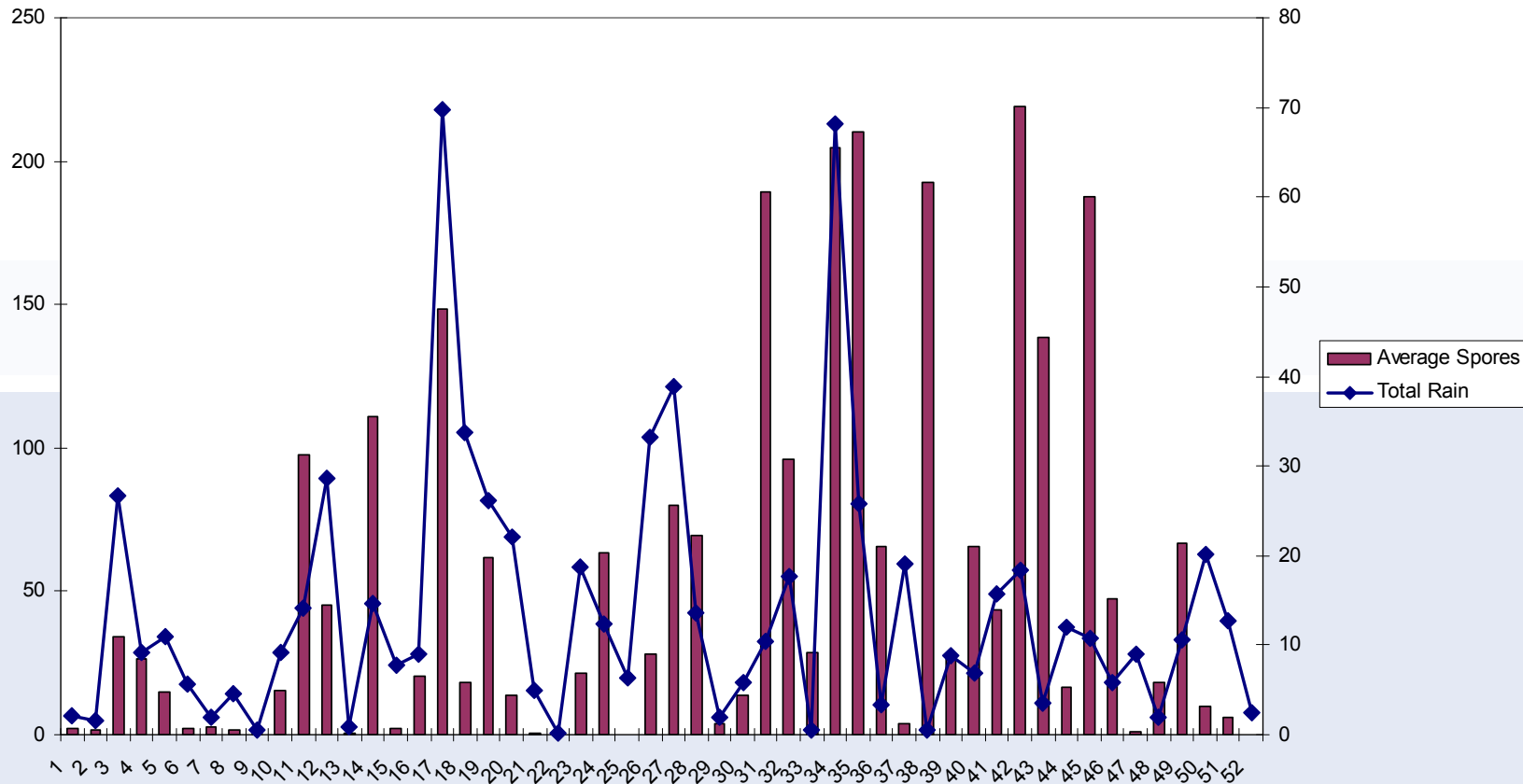


1. Spread and infection: Spore Trapping

- 3 spore traps around each of 2 trees
- Traps changed weekly for one year
- Collected environmental data



1. Spread and infection: Spore Trapping



- Some relationship between rainfall and spore release

1. Spread and Infection: Spore Trapping



- Further investigations:
 - ▶ Ice melt on stems
 - ▶ Temperature
 - ▶ Consecutive rain days

1. Spread and Infection:

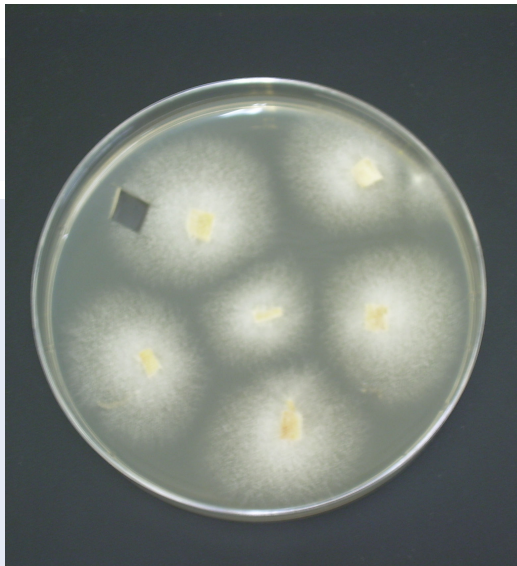
Long-term spore viability



- Aim: determine long-term viability of ascospores within perithecia.
- Preliminary trials: May require an overwintering period.
- Methods:
 - ▶ 4 treatments: room temp, 4°C, -18°C, room temp/- 18 °C alternating
 - ▶ 2 wood blocks/treatment
 - ▶ Assessed after 1, 2, 3, 6 and 12 months

1. Spread and Infection:

Effect of resin on growth and germination



- Aim: examine the effect of pine resin on mycelium and spores.
- Methods:
 - ▶ Grow *Nectria* on medium containing resin.
 - ▶ Assess spore germination when resin is present.

PROBLEM: Pine resin does not dissolve in water!

1. Spread and Infection:

Mating Study



- Two mating types needed to produce fruitbodies in culture
- How many mating types are there?
- Do you need more than one mating type for fruitbody production in the field?



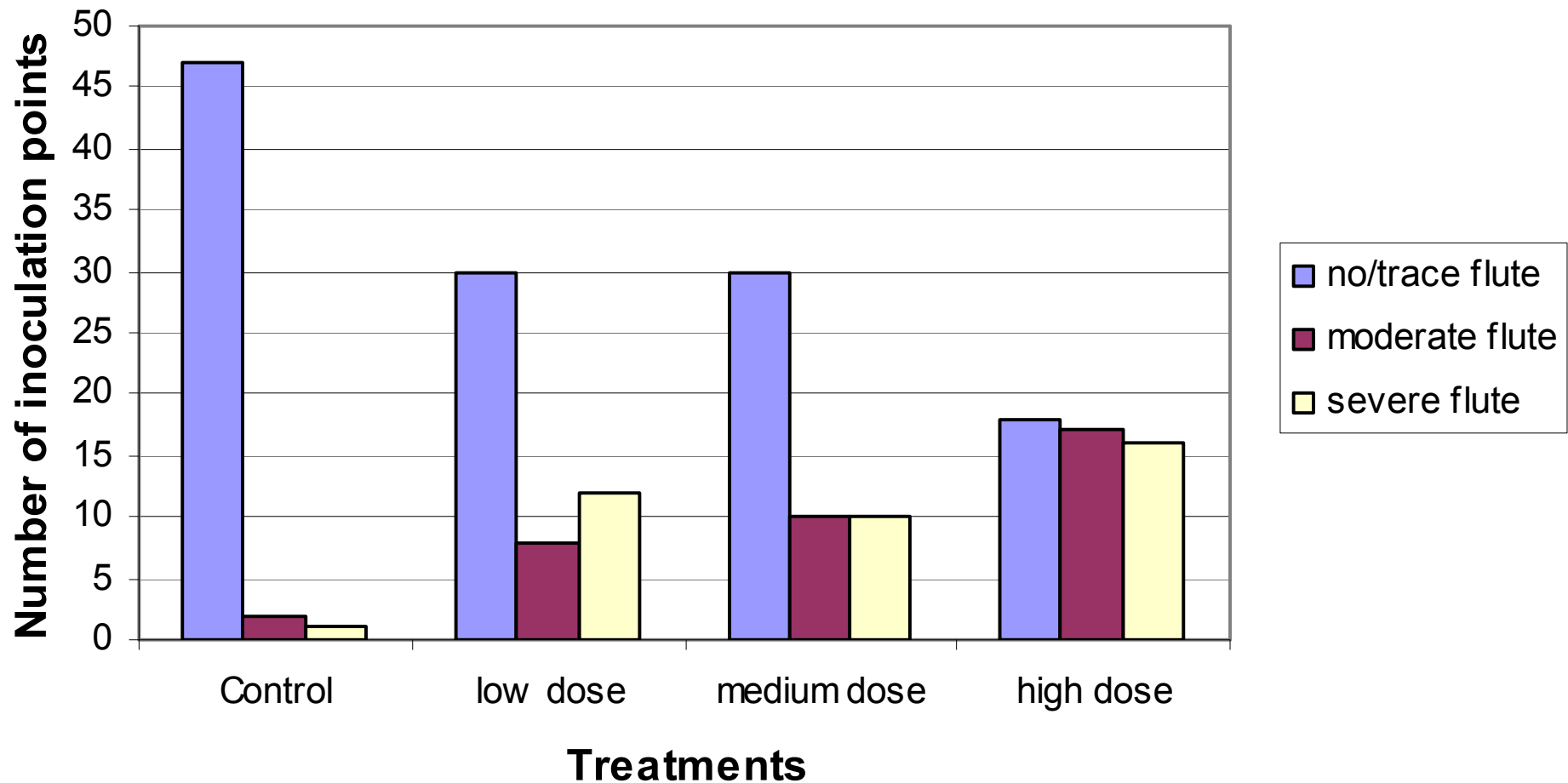
2. Host Response: Inoculum Concentration Trial



- How much inoculum do you need for successful infection?
- How does the tree respond to increasing inoculum loads?
- 50 trees each inoculated at 3 points plus a water control
- Usual concentration, 1/10th strength and 1/100th strength
- Established October 2005
- Assessed after 6 and 12 months

2. Host Response: Inoculum Concentration Trial

Response to different inoculum concentrations



2. Host Response: Inoculum Concentration Trial



- Inoculum concentration had an effect in 24 out of 50 trees
- Strong individual tree response:
 - Ten control points showed some response to wounding
 - Thirteen trees developed severe flutes – dose not important
 - Nine trees did not develop flutes at the low dose but did at medium or high
 - Three trees showed no response at any dose
 - Fruit bodies recorded on nine trees at 12 months and a further three trees at 14 months

Nectria: What do we know so far?



- *Nectria* dispersed by water and appears to have some correlation to rainfall patterns
- *Nectria* fruitbodies produce spores all year round



- Margaret Dick & Lindsay Bulman, Ensis
- Ian Simpson, Ensis
- Peter Oliver & Ross Chambers, City Forests
- John Spiers, City Forests
- David Thode, PF Olsen
- Aaron Gunn, Paul Greaves & contractors, Wenita
- David Orlovich & Mary Anne Miller, Otago University