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Client Report No. 39457

**Susceptibility of other conifers to infection by *Nectria fuckeliana* and canker formation. Interim report February 2006.**

Date: February 2006  
Client: FBRC  
Contract No:

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## EXECUTIVE SUMMARY

### OBJECTIVE

Six species of 'other conifers' were inoculated in 2005 with *N. fuckeliana* in a small pilot trial to determine whether stem cankers develop.

### KEY RESULTS

*Pinus radiata* developed a higher percentage of symptoms from both sapwood and cambial inoculation points. There were no external symptoms on either *Sequoia sempervirens* or *Larix decidua*. *Cupressus macrocarpa* developed symptoms from over 30% of the inoculation points. Douglas fir did not develop external or internal symptoms.

### APPLICATION OF RESULTS

These results give an early indication that Douglas fir may not be susceptible to disease caused by *Nectria fuckeliana*, and that the other species may be affected to some degree. However these results are drawn from a very small sample and very early in the expected disease development cycle for this pathogen.

### FURTHER WORK

Trees will be reassessed in late May 2006.



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Information for Ensis abstracting:

Contract number	
Client Report No.	39457
Products investigated	
Wood species worked on	<i>D. fir, P. ponderosa, P. contorta, P. radiata, C. macrocarpa, L. decidua, S. sempervirens</i>
Other materials used	<i>Nectria fuckeliana</i>
Location	Otago, New Zealand

# INTRODUCTION

Overseas, *Nectria fuckeliana* has been recorded as a relatively weak pathogenic agent. Its primary hosts, species of spruce (*Picea*) and fir (*Abies*), show evidence of disease only when under considerable stress as a result of extreme climatic conditions. It has seldom been recorded on *Pinus* overseas and the flute canker of *P. radiata* in New Zealand is a first record of stem disease of pines caused by *N. fuckeliana*. As part of the programme to develop strategies for responding to this disease the susceptibility of some other conifers to infection and to canker formation is being evaluated.

Six species of 'other conifers' were inoculated in 2005 with *N. fuckeliana* in a small pilot trial to determine whether stem cankers develop. More detailed tests may follow. This will be dependent on the results from the pilot.

# MATERIALS AND METHODS

Three species *Cupressus macrocarpa*, *Sequoia sempervirens* and *Pseudotsuga menziesii*, along with *Pinus radiata* for comparison, were inoculated with a spore suspension of the *Acremonium* stage of *N. fuckeliana* in April 2005. *Larix decidua*, *Pinus contorta* and *Pinus ponderosa* were inoculated in June 2005, plus *Pinus radiata* for comparison. Inoculations were generally low on the stem. A hole ~ 10 mm deep was drilled into stem and a 500µl droplet of spore suspension ( $10^6$  spores/ml) placed in each hole with a µpipette. For *C. macrocarpa* and *P. menziesii* additional inoculations were made by removing a circle of bark and spraying the exposed cambium with the spore suspension. Control plants were treated with sterile water.

April treatments were visually assessed in both June and September 2005. No symptoms of stem cankers/lesions were apparent on either occasion.

All treatments were assessed in late November 2005 (Tables 1 and 2) and the length and width of stem depressions associated with inoculations were measured. Also a few trees (Table 3) of each species were felled so that the sapwood could be examined and isolations made to determine extent of sapwood colonisation of *N. fuckeliana*. No samples were collected from the *Larix*. The *P. contorta* stand had unfortunately been felled.

# RESULTS

**Table 1:** Number of sapwood inoculation points and external symptoms assessed in November 2005

	Number inoculated	Number with depressions	Symptoms (%)	Number of controls	Number with depressions	Symptoms (%)
<i>P. radiata</i>						
Inoc April 05	10	9	<b>90</b>	5	5	<b>100</b>
Inoc June 05	8	0	<b>0</b>	-	-	-
<i>P. ponderosa</i>	28	3	<b>11</b>	16	0	<b>0</b>
Douglas fir	18	2	<b>11</b>	13	2	<b>15</b>
<i>C. macrocarpa</i>	20	7	<b>35</b>	20	4	<b>20</b>
<i>S. sempervirens</i>	32	0	<b>0</b>	32	0	<b>0</b>
<i>Larix decidua</i>	24	0	<b>0</b>	24	0	<b>0</b>
<i>P. contorta</i>	30	-		14	-	

**Table 2:** Number of cambial inoculation points and external symptoms assessed in November 2005

	Number inoculated	Number with depressions	Symptoms (%)	Number of controls	Number with depressions	Symptoms (%)
<i>P. radiata</i>	10	7	<b>70</b>	5	2	<b>40</b>
Douglas fir	14	0	<b>0</b>	13	2	<b>15</b>
<i>C. macrocarpa</i>	20	6	<b>30</b>	20	1	<b>5</b>

*Pinus radiata* developed a higher percentage of symptoms from both sapwood and cambial inoculation points. There were no external symptoms on either *Sequoia sempervirens* or *Larix decidua*. *Cupressus macrocarpa* developed symptoms from over 30% of the inoculation points (Fig. 1)

Figure 1: Depressions on *Cupressus macrocarpa***Table 3:** Number inoculation points destructively sampled in November 2005 and internal symptoms

	Inoculated		Control	
	Number of inoculum points	Average length of stain (mm)	Number of inoculum points	Average length of stain (mm)
<i>P. ponderosa</i>	4	48	0	12
Douglas fir	2	0	2	0
<i>C. macrocarpa</i>	5	34	2	6
<i>S. sempervirens</i>	6	58	3	36

*Sequoia sempervirens* developed stain from both inoculated and control wounds. *Pinus ponderosa* and *C. macrocarpa* also developed stain, usually from inoculated wounds, and Douglas fir did not develop stain.

## DISCUSSION AND CONCLUSIONS

This evaluation was undertaken approximately 6 months after treatments were applied. There were no external signs of infection, i.e. depressions or lesions on the stems of any of the inoculated *Sequoia*, or of the *Larix*. *Sequoia sempervirens* has a deep and very fibrous bark and lesions would only be visible if very pronounced. However the *Larix* has bark similar in texture and depth to that of the other species. Some depressions were visible around the inoculation points in the other species, including the water controls for the *C. macrocarpa*, Douglas fir and the *P. radiata*. This indicates a response to the physical injury in these species. The difference between inoculated treatments and controls is expected to become more marked with time and should be apparent at the next assessment which will be undertaken in June or July 2006.

Discolouration of sapwood was more marked and extended further from the inoculation point in the *Sequoia* than for the other species that were destructively sampled. There was no discolouration in the Douglas fir sapwood.

*Nectria fuckeliana* was only reisolated from points well within the stained sapwood and not from every point sampled. It was more frequently recovered from the *Sequoia* than the other species. It was only once reisolated from Douglas fir sapwood and this was the point immediately at the end of the inoculation hole.

These results give an early indication that Douglas fir may not be susceptible to disease caused by *Nectria fuckeliana*, and that the other species may be affected to some degree. However these results are drawn from a very small sample and very early in the expected disease development cycle for this pathogen.