

## A pine pitch canker look-alike

A sample of shoot dieback from a young (2-years-old) radiata pine was received in early July. Alarm bells rang as soon as I saw the following combination of symptoms: resin bleeding (Fig 1), resin-soaked wood



Fig 1 resin bleeding

(Fig 2) and salmon-coloured cushions of a fungus fruiting in the bark of the dead shoot (Fig 3). Microscopic examination of a piece of the fungus fruiting-body showed 4-6 celled spores with a distinctive "foot" at their base (Fig 4). These are textbook symptoms of the disease "pine pitch canker" caused by the fungus *Fusarium circinatum*.

Pitch canker is not present in Australia or New Zealand and is at the top of the list of exotic forest pests and pathogens we want to keep out of our region. Native and planted stands of radiata pine in California have suffered major damage since the disease was first detected in that

area in 1986 (fig. 5). Radiata pine is highly susceptible to the fungus causing pitch canker. The disease results from the fungus infecting and killing the bark of young shoots, the main stem and branches. Infected tissue produces copious resin that bleeds down the stem and soaks the wood inside the infected bark turning it a distinctive amber colour. Shoots and young seedlings are usually completely girdled and killed by the bark infection. In older trees the disease causes poor stem form resulting from shoot dieback.



Fig 2 resin-soaked wood



Fig 3 fruiting bodies

Our immediate response to the suspected outbreak of pitch canker in Tasmania was to quarantine the affected plantation. With the area quarantined we then turned our attention to getting a confident identification of the fungus isolated from the pine shoots. Fungi in the genus *Fusarium* are notoriously difficult to identify with certainty. We sought assistance from the Forest Research Institute in New Zealand. They were able to compare the DNA of the fungus isolated from the pine shoots in Tasmania with several cultures of the pitch canker fungus from the USA. These tests conclusively proved that the fungus we isolated was not the same as the fungus that causes pitch canker. Although we haven't got a definite identification of the fungus it most closely resembles *Fusarium lateritium*.

This fungus is already known to be present in Tasmania and can occasionally be isolated from pine seedlings in the nursery.

It was a great relief to get confirmation that the fungus we found was not *F. circinatum*. It was an even greater relief to the owner of the plantation to have quarantine restriction lifted from the plantation. Our final diagnosis of the shoot dieback was that the *Fusarium* was only a weak pathogen, which colonised the already moribund shoots of severely nutrient deficient trees. Laboratory tests showed the fungus was unable to cause disease in shoots of healthy seedlings.

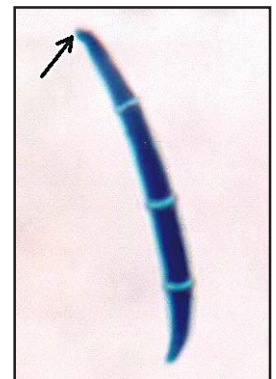


Fig 4 fungal spore

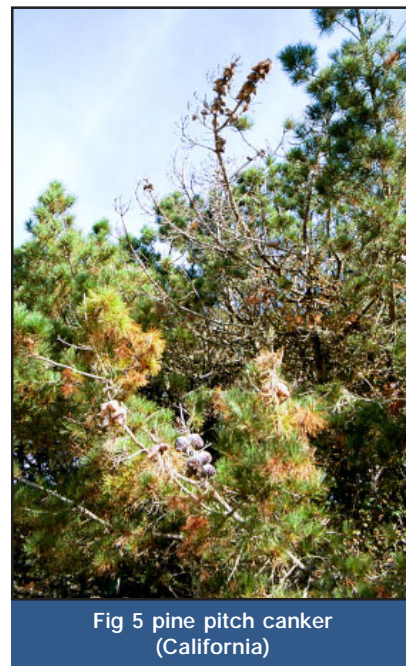


Fig 5 pine pitch canker (California)

This is the second false alarm of suspected incursions of exotic pathogens we've had over the past two years.

The earlier one being the pine stem galls (suspected western gall rust) found in April 1999. Far from being a waste of time these false alarms are excellent "dry runs".

They provide invaluable practice to test and refine the way we would deal with a real incursion of an exotic pest or pathogen. The pitch canker false alarm also gave us a very important bit of additional information. Until this problem was found it was thought that *F. circinatum* was the only *Fusarium* species capable of causing symptoms of shoot

dieback and resinosis in pines. We now know that at least one other species of *Fusarium* can cause virtually identical symptoms.

## Forest health update

With the exception of a number of high altitude compartments with delayed establishment, this issue of the Forest Health Bulletin sees the completion of intensive health status surveys in the 1999 - planted eucalypts. Symptoms associated with nutrient deficiency and/or stress, such as premature leaf senescence and leaf loss (fig.6), were widespread this year. Lower than average rainfall certainly played a role but extensive grass competition on ex-pasture sites was also an issue.

In the south, where drought conditions were more severe, adverse impacts on mean annual increment (MAI) were noticed and an increase in height variability was often apparent.





Fig 6 premature leaf senescence

General foliar chlorosis, which is associated with nitrogen deficiency (Dell *et al.* 1995), was widespread throughout the state (fig.7). There was some indication that this may have been impacting on performance because there was a significant negative correlation between foliar chlorosis and annual growth rate.

Interveinal chlorosis was also common and appears most similar to symptoms that are associated with iron deficiency. Iron is immobile in the phloem and does not move out of older leaves even under deficiency (Dell *et al.*1995).

## What to look out for in spring

During routine surveillance earlier this year a region of shoot wilt was encountered in a compartment of young *Eucalyptus nitens* in the central northwest of the state. This damage was scattered to common in the region it occurred and some trees had up to 50% of shoots affected. Insect damage was apparent at the base of the necrotic tissue (fig. 9).

It turned out to be damage caused by adult feeding of the lesser shoot weevil (*Rhachiodes dentifer* Bohemon) which is more commonly associated with *Eucalyptus globulus*. Superficially this damage is similar to that caused by coreid bugs, young shoots are attacked causing wilting and subsequent death of the terminal portion. Adults are fawn to grey-brown, 5-6mm long, covered with scales and their wing covers bear a number of prominent tooth-like tubercles (Elliot & de Little 1984). These weevils feed by boring into young shoots and small branchlets.



Fig 9 shoot necrosis caused by adult weevil

The females deposit eggs into the feeding cavities of larger diameter branchlets and when the larvae hatch they continue to feed on the tissue, causing swelling. Larvae are creamy white, legless, have a brown head capsule and reach about 8mm in length (Elliot & de Little 1984, Elliot *et al.* 1998). Pupation is thought to occur in the soil and adults will start to emerge in October, with the main emergence occurring in November/December (Dick Bashford, pers. comm.). Branchlets affected by larval feeding can be substantially weakened and become more susceptible to wind damage. The end result can be multiple forking and poor form in young trees.

## References

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There was a significant positive correlation between interveinal chlorosis and both annual growth rate and altitude.

As such both cases probably reflect below optimum uptake from the soil; the former due to rapid growth rates, the latter because of low temperatures. There also appeared to be a higher incidence of symptoms associated with micronutrient (copper, zinc *etc.*) deficiencies; such as leaf deformation, deformation of new growth and microphyllly; than has been observed in previous years.



Fig 7 general foliar chlorosis

*Mycosphaerella* infection was significant in both the northwest and northeast of the state (fig. 8).

In the northwest this was primarily *M. nubilosa* infection of *Eucalyptus globulus* and consequently significant defoliation and reduced performance are expected.

In the northeast infection was largely *M. cryptica* on *E. nitens*. Although *M. cryptica* has not had significant impact in the past, some defoliation seems likely and the situation will need to be monitored. As mentioned in the previous bulletin a research programme is being established to investigate environmentally benign control options.



Fig 8 defoliation of *E. globulus* by *Mycosphaerella*