Forest Health News

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RED NEEDLE CAST UPDATE

A severe outbreak of red needle cast (RNC) in some *Pinus radiata* forests in the central and eastern North Island during the latter half of 2016 is an example of the unpredictable and uneven nature of this disease. Our research on RNC continues to focus on predicting when disease outbreaks will occur, as well as identifying resistant *P. radiata* genotypes and developing effective chemical control methods. We reported on our prediction work in FH News 268 (August 2016). Here we feature our progress over the last six months, most notably on our work investigating the weather and environmental conditions that may trigger outbreaks, and possibilities for chemical control.

We have begun longer-term monitoring of the extent and severity of RNC to better understand how weather conditions and seasonal changes initiate outbreaks. This work started in 2016 and uses 50 survey points in the central and eastern North Island. Monitoring will continue for a number of years. The aim of the work is to build complementary data sets of disease prevalence and weather conditions which will be used to develop a predictive model.

We have also been conducting studies to determine the infection period of the causal agent of RNC, *Phytophthora pluvialis*. Young, potted *P. radiata* plants placed near older stands with RNC (a source of inoculum) were successively exchanged for fresh sets of plants at fortnightly intervals. Traps using floating pine needles as baits were also positioned at the same locations to determine when spores of *P. pluvialis* were released (Picture).

Findings from this study have been promising. We determined that young plants became infected from July through to October, while *P. pluvialis* was recovered from spore trap baits in October. Results indicate that more plants and traps will be needed in future studies. The appearance of sporangia on exchange plants suggests that the pathogen is capable of more than one infection cycle during a season, which helps to explain the rapid increase in disease levels seen in some years. Maximum disease expression occurred during late winter and spring and then gradually declined over summer as affected needles were cast and replaced by the new flush of needles. This resulted in trees that appear generally healthy and green, but with a low crown density.

The prolonged period in which infection occurs highlights the need for a control method that can persist for at least four months. We have conducted a number of chemical control trials over the past two years and have made progress assessing the efficacy of the active ingredients cuprous oxide and phosphite. These chemicals were applied to young plants growing in pots in three studies, and in a large scale field trial they were applied aerially.

Potted *P. radiata* plants and a bucket needle-baited spore trap to determine infection period and timing of spore release.

The pot trials showed promising results. Needles taken from plants treated with either copper or one phosphite treatment developed fewer and smaller lesions than untreated needles after inoculation with *P. pluvialis*. In one of these studies, copper showed effective disease suppression for up to six months following treatment, while copper and phosphite applied together did not result in increased disease control. Results from the field trial have supported those observed in the pot trials. Copper suppressed disease development three months after the initial application in February 2016, but after nine months no treatment effects could be demonstrated.

Newsletter of the Scion Forest Protection team. Edited by Nicolas Meurisse and Lindsay Bulman, Scion, Private Bag 3020, Rotorua 3046, New Zealand. Email: nicolas.meurisse@scionresearch.com. Website: http://www.scionresearch.com/biosecurity

Results with phosphite have generally been variable within and between trials and treatments. Phosphite applied at 12 kg/h initially reduced lesion length in relation to the control, but this effect did not persist. We will be working next on alternative methodologies to more closely follows the natural situation and determine whether there is potential to pursue phosphite as a potential treatment for RNC. Up to this point, we have been using a detached needle assay to evaluate treatment effectiveness. However, it is likely that detached needle assays provide only a limited assessment of the efficacy of systemic chemicals such as phosphite, which rely on a live plant response for full effect. A favoured approach is to use plants, inoculate them and then grow them in controlled conditions to compare disease progress. That approach also removes the risk of unfavourable conditions for disease development in the field that might mask treatment effects.

There is a way to go before the picture of RNC severity and relationships with landscape features is complete. A study is currently underway using LiDAR (Light Detection and Ranging) data and colour aerial photographs to determine the distribution of red needle cast and compare it with the local environment (i.e. topographical features such as aspect, slope, elevation, or stand characteristics). Data will be assessed from 3200 ha of a central North Island forest that has had variable levels of RNC. In addition, disease levels and annual growth rates of individual trees from 10 ground plots will be evaluated over a 4-5 years period to determine the effect of RNC on productivity.

Lindsay Bulman, Carol Rolando and Ian Hood

NEW FACES

Ilze Pretorius is an air quality scientist who has a PhD and five years' experience as a researcher. She is skilled in a range of atmospheric dispersion, meteorological and computational fluid dynamics models. Ilze will be working with Tara Strand and Brian Richardson on a number of projects including spray drift and smoke modelling.

Ilze Pretorius

Aymee Lewis is a molecular technician who will be supporting the forest diseases project in a variety of work and the diagnostic laboratory helping with molecular identification of suspect pathogens. Aymee has recently completed a Bachelor of Science (Microbiology, Ecology) at Massey University and has worked with Plant and Food and the Hopkirk Research Institute in Palmerston North.

Aymee Lewis

We have several other recruitments in process and look forward to informing you of successful appointments in the near future.

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