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CONTROLLING NEEDLE DISEASES OF PINES

Dothistroma needle blight is successfully controlled by copper spray applied in late spring and again, if needed, in late summer. Over the years the amount of copper and the volume of spray applied per hectare have decreased significantly due to advances in spray technology and sound research. In the early 1980s, 2.08 kg copper metal equivalent in 50 litres of water was applied per hectare. Now, the amount of copper applied is 0.86 kg metal equivalent in 5 litres of an oil and water mix per hectare. Research funded by the Dothistroma Control Committee has shown that the same amount of copper applied in 3 litres per ha is as effective as the current treatment to control dothistroma. Some forest companies used 3 litres per hectare last season and reported improved operational logistics, and cost savings due to reduced ferry time by being able to treat a larger area per load. The committee will test the effect of reducing the amount of copper down to 0.6 kg per hectare (at 3 and 5 litres per ha) in October.

Dothistroma spraying at 50 l/ha. At 3 l/ha you wouldn't be able to see the spray plume.

An operational chemical control method for red needle cast has not yet been developed, but work in this area is progressing well. Recently completed trials using potted cuttings showed that copper has potential to control red needle cast in the field. Laboratory tests were carried out where needles were inoculated with *Phytophthora pluvialis*, the cause of red needle cast, at two intervals after copper treatment (7 and 84 days). Smaller lesions developed on needles sprayed with copper applied once or twice compared with the unsprayed control. While copper is cheap to apply and the industry is very well set up to use it there are potential drawbacks that have to be overcome before it can be adopted. Firstly, *Phytophthora pluvialis* releases spores over a long period and it is likely that the effects of the copper will have to last for at least 6 months. Secondly, laboratory tests using small plants do not replicate field conditions. The fact that smaller lesions developed on needles treated with copper in the laboratory doesn't necessarily prove that disease control in the field through inoculum reduction and/or disease suppression will be achieved. A field experiment testing the effect of copper applied operationally needs to yield positive results before copper could be confidently recommended as a suitable product to control red needle cast.

Lindsay Bulman and Stefan Gous

Scion's pathology team happily recording numbers of lesions caused by *P. pluvialis* on radiata pine needles.

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

TECHNOLOGY USED TO IMPROVE OUR SPRAY DRIFT MODELS

Aerial spraying with pesticides is an important approach to control weeds, insect pests and diseases in forestry, and has been used to eradicate damaging new to New Zealand pests in urban areas. Foresters are very aware of the need to quantify the likely level of spray drift in order to maintain treatment efficacy and ensure drift out of the target area is contained within an adequate buffer zone. AGDISP™ is a user-friendly spray deposition model developed to simulate trajectories and landing positions of droplets released from aerial and ground pesticide applications. There is a school of thought that AGDISP™ is overestimating spray drift over aerodynamically rough surfaces such as a forest canopy. A study was undertaken to collect data that will be used to evaluate the accuracy of AGDISP™ and, if necessary, improve it.

Measuring spray drift over a forest canopy is highly complex and challenging, a possible reason for the recent trial being the first attempt to do this over an open pine stand. We were pleased to have some longstanding collaborators from the US Forest Service and University of South Carolina participate in the trial. The latter brought a new, state-of-the-art elastic backscatter LiDAR instrument that allowed us to measure the height and density of the drifting spray cloud. This study was the first application of that technology where LiDAR data were combined with field measurements of deposition within and above a rough environment like a forest canopy. Logistically the study was demanding. The trial took place in a central North Island forest in early autumn. On spray days over 10 people were deployed, and over 5 people days were spent setting up a 10 m tall sampling tower, deployed with eight smaller towers with sampling devices, plus another 10 m tower equipped with five wind sensors and eight temperature sensors to measure changes in these parameters every second or less.

The team is currently analysing the over one terabyte of collected data which will be used to advance AGDISP™ so it can handle deposition on rough surfaces. This will ultimately result in considerable benefits for the forest industry. Along with the obvious benefits of improved deposition predictions, hence reducing pesticide treatment costs while maintaining high environmental standards, there will be spin off benefits from the data collected. These include improving our capability to better predict existing pathogen, pest, and wilding spread. The data will also provide the foundation to assist with building aerially targeted control operations and it will improve our ability to eradicate new pests and pathogens.

University of South Carolina's backscatter LiDAR measures the spray drift aerosol cloud.

10 m tower arrayed with sensors to measure wind and temperature every second or less.

AGDISP™ is available to foresters through Scion, the US Forest Service and the US EPA.

Tara Strand

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