

Phosphite large tree treatment trials: initial observations brief report

Horner I, Hough E, Horner M

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1 INTRODUCTION

Previous forest trials testing phosphite for kauri dieback control have provided promising results, with lesion healing observed in most phosphite-treated trees indicating a strong curative effect. However, one limitation of the first round of trials was that they were all done with trees in the 'ricker' size class, mostly 15 to 35 cm diameter. There has been no testing on larger trees. If there is a desire in the future to treat large iconic trees or even moderate-sized trees, we need to have information on appropriate treatment regimes that are safe and effective, so that informed decisions can be made. Trunk girth is generally used to calculate the volume of phosphite that should be applied to each tree. But with giants such as kauri, scaling up from rickers to trees with girths of 5–15 metres may be difficult. It is very important that effects on larger trees are assessed before widespread release of the treatment, to ensure that appropriate dose rates are recommended. A balance must be struck between rates sufficient to suppress the disease, yet still safe for the tree. Earlier trials also indicated some problems with phytotoxicity, particularly with higher phosphite rates, so this must also be addressed in any future trials.

New trials have been established on large kauri trees to help to determine appropriate treatment regimes, with emphasis on phosphite rates and doses lower than those used in previous trials.

2 METHODS

2.1 Trial sites and tree selection

Three sites were selected for the trials: Puketotora Rd, near Kerikeri in Northland, Trounson Park in Northland, and the Cascades in the Waitakere Ranges, Auckland. The Puketotora block is on a private land, and Trounson Park and the Cascades are under Department of Conservation and Auckland Council jurisdiction, respectively.

Trees in the trial are in the mature stage. At Puketotora, trees range in size from 0.4 to 1.1 m trunk diameter. At Trounson, trial trees range from 1.0 to 2.1 m trunk diameter, and trees at the Cascades range from 0.6 to 2.4 m diameter. All trial trees showed symptoms of kauri dieback at the start of the trial, including basal trunk lesions.

2.2 Treatments

1. Untreated control
2. 4% phosphite trunk injection, 20 mL every 40 cm
3. 4% phosphite trunk injection, 20 mL every 80 cm

Treatments were applied at the Puketotora site in March 2016. Because of delays in the consent processes for the Trounson and Cascade sites, treatments were not applied until November 2016.

The determination of phosphite concentration and doses for the large trees was difficult. With trunk girth being the main determinant of dose and no international experience with treating trees of such size, a very conservative approach was taken. This decision was in part influenced by previous experiences with phytotoxicity. The selected phosphite concentration of 4% with injector frequency of one every 40 cm corresponds to the lowest rate and dose used in the concurrent 'Trunk spray and low rate trial' (PFR report # 14471). We have also included another treatment with an even lower dose of one injector every 80 cm girth. Although this dose may be too low to provide adequate long-term control, we have the opportunity to observe effects over the first year or two, then make another application if deemed appropriate.

2.3 Trial design

There are a total of 42 trial trees, (nine at Puketotara, 15 at Trounson and 18 at the Cascades). This is double what was proposed in the initial trial outline, but should lead to more robust data. At each site, trees were divided evenly among the three treatments. To ensure a relatively even distribution of disease symptoms across treatments, at each site trees were placed into groupings based on disease parameters such as lesion activity and canopy symptoms, before randomly assigning the various treatments within each grouping.

2.4 Initial assessments

Before treatment, baseline assessments were made on various tree growth and health parameters. These included tree girth, canopy health score, canopy colour, plus trunk lesion size and activity. Selected lesion margins were marked for subsequent measurement of expansion, and canopy photographs were taken for later comparison.

2.5 Periodic assessments

Tree health and lesion expansion plus activity will be measured approximately every 6 months. Assessments to date have been in August 2016 for the Puketotara site and February/March 2017 for all three sites.

No phytotoxicity symptoms have been observed in any of the trees. It is too early to draw conclusions about treatment efficacy, as it is only 3 months since treatments were applied at Trounson and the Cascades. Early observations suggest that on average, lesion expansion and activity appears less in the lowest dose injection treatment (80-cm spacings) than in the higher dose (40-cm spacings) or untreated controls. If this trend continues, it would suggest that very low doses (substantially lower than used on various trees worldwide), are better than higher doses. However, it must be emphasised that it is still too early in the trial to draw this conclusion.

3 PLANS

Six-monthly assessments of tree health, lesion activity and spread, and phytotoxicity symptoms will be continued for a period of at least 4 years. A brief report will follow each assessment.

Re-application of injection treatments will be considered early in 2018, based on results obtained up to that time. Any required re-application is most likely to be on trees in treatment 3, where injector spacing was 80 cm.

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Report approved by:

Ian Horner
Scientist/Researcher, Pathogen Ecology and Control
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Suvi Viljanen
Science Group Leader, Plant Pathology
March 2017

For further information please contact:

Ian Horner
Plant & Food Research Hawke's Bay
Private Bag 1401
Havelock North 4157
NEW ZEALAND
Tel: +64 6 975 8880
DDI: +64 6 975 8925
Fax: +64 6 975 8881
Email: ian.horner@plantandfood.co.nz

This report has been prepared by The New Zealand Institute for Plant & Food Research Limited (Plant & Food Research).
Head Office: 120 Mt Albert Road, Sandringham, Auckland 1025, New Zealand, Tel: +64 9 925 7000, Fax: +64 9 925 7001.
www.plantandfood.co.nz

