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Assessment of the control of *Phytophthora* root rot disease spread by Spin Out[®]-treated fabrics in container-grown hardy nursery-stock

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Abstract

A non-woven capillary matting fabric (Tex-R[®] Pro), coated with a latex polymer-based formulation of cupric hydroxide (Spin Out[®]), developed to cover standing-out areas for weed control and to prevent rooting through, was assessed for its potential to reduce the spread of *Phytophthora* root rot in container-grown hardy nursery-stock. As well as production bed covers, the fabric was cut into discs and (a) used to cover the tops of plant containers (pot toppers) and (b) inserted to cover the holes in the bottoms of plant containers (disc inserts). These were all tested as barriers to the passage of infective zoospores of *Phytophthora cryptogea* in enclosed re-circulating irrigation systems growing test plants of *Chamaecyparis lawsoniana*. Bed covers and disc inserts significantly reduced disease spread, as indicated by the incidence of symptoms and infection, and by bait and colony-forming unit tests of re-circulating water, both in overhead- and trickle-irrigated systems. Pot toppers were not effective. This may be explained by the mode of spread of *Phytophthora* in such irrigation systems, which appears to be largely via capillary water and therefore not intercepted by toppers. These results were supported by *in vitro* studies on the passage of zoospores through fresh and used fabric samples which showed that all Tex-R Pro fabric materials significantly reduced the survival of zoospores and zoospore cysts (to between 0% and 4.8%) compared with untreated fabrics (between 32.3% and 42.8%). Analysis of Cu²⁺ concentrations in re-circulating irrigation water and in matting samples at the end of the field experiments showed that the majority of the active ingredient stayed bound to the fabric. These results demonstrate that it is possible to deploy Spin Out-treated fabrics in nurseries to help prevent the spread of *Phytophthora* propagules in addition to their primary use for controlling weeds and rooting through.

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Keywords: Cupric hydroxide; 'Spin Out'; *Phytophthora*; Coated capillary matting; Disease control

1. Introduction

The effects of copper compounds on root distributions in container-grown plants were first described by Stinson and Keyes (1953), in experiments assessing the control of algal growth on clay pots. The subsequent development of copper treatments for plant containers, their efficacy for pruning containerised root systems and the great benefits from the development of more fibrous root systems,

containing large numbers of visible root initials at transplanting has been reviewed by Struve et al. (1994). There is now a latex polymer-based formulation of cupric hydroxide (Spin Out[®], Griffin Corporation) commercially available, as well as a range of Spin Out-treated products, including pre-coated containers and surface-coated fabric coverings for standing-out areas such as capillary sand beds.

The possibility of phytopathogens being introduced to nurseries from contaminated water has long been recognised (Bewley and Buddin, 1921), and root rot epidemics caused by oomycetes are readily initiated in this way (Klotz et al., 1959; Pittis and Colhoun, 1984). The risk of contamination is greatly increased if nursery runoff from rainfall and irrigation is collected and re-used (MacDonald

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