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RESEARCH CONFERENCE - 1980

PHYTOPHTHORA AND RADIATA PINE DEATHS IN THE DONNYBROOK SUNKLANDS

Research Programme - M. Stukely

1. Phytophthora infections and P. radiata deaths

There is a strong link between Pinus radiata deaths and Phytophthora cinnamomi (P.c.) infections. Initially this was thought to be simply an infection of the smaller roots. However, Phytophthora (sometimes P.c., sometimes P. cryptogea, and sometimes both) has now been isolated from various positions in the collars and adjacent large roots (to 5.0 cm diam.) of dying and recently-dead trees up to 9 years old. Collar infections sometimes extend several cm above ground level.

The distribution of new deaths in the field will be studied in relation to the earlier ones, to gain information on the spread of disease.

2. Inoculation trials

Soil beneath P. radiata at Jarrahwood (p. 1979, clovered and non-clovered) and Willcocks A (p. 1952, unthinned) has been artificially inoculated with P.c. in order to observe the distribution and timing of infections, and the survival of the inoculum in the soil.

So far, as expected, no deaths have occurred.

Inoculum survival was generally high (at least 95%) in samples taken at monthly intervals from May to October.

These plots will be monitored and sampled until at least winter 1982, covering two spring periods of high P.c. activity and two summer-autumn periods of high water-stress to the pines.

Deaths in the plantation have occurred mainly in a "pepperpotted" fashion, spread among apparently healthy trees. It is hoped that these trials will provide some information on the question of whether the healthy trees are exhibiting tolerance to P.c. infection, or merely escaping infection due to a sparsely scattered inoculum.

Further plots are to be inoculated in 1981 at Willcocks A (p. 1952) where thinning has been done during 1980. This should give some useful additional information on the disease susceptibility of trees over 25 years old.

3. Sub-clinical infections in healthy trees

Whole root systems of several apparently healthy one-year-old trees growing adjacent to a dead one (with P.c. infection) have been plated. P.c. and P. megasperma root-infections of varying extent were found.

Large-scale sampling of the root-systems of two healthy five-year-old trees (one in the Agroforestry area, one outside it) was also attempted. However, the only Phytophthora infection detected was P. cryptogea in a single root of 2mm diameter in the latter tree.

Several aspects of this type of infection warrant further investigation, including age of tree, location of tree with respect to known sources of inoculum and soil type; sampling time (and

corresponding degree of stress on the tree), and fertiliser history.

4. Environmental monitoring and *Phytophthora* isolations

Repeated sampling of soil at regular intervals from a stand with known *P.c.* infections (Molloy plantation, p. 1972) commenced in September, in conjunction with continuous recording of soil temperature and moisture. It was hoped that the *P.c.* inoculum levels would show some response to changes in these environmental factors. However, *P.c.* recoveries have mostly been low throughout the period. This trial is continuing.

5. Samples tested from other areas

(a) At West Manjimup Seed Orchard, three *P. radiata* trees (approx. 8 years old), considered to be dying because of graft incompatibility, were all found to have *P. cryptogea* collar infections.

(b) Recently-dead banksias from several sites close to the Gnangara pine plantation were found to have *P.c.* collar-infections.

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