FIELD SURVIVAL OF *P. cinnamomi* IN CLODS OF DISEASED SOIL

by

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SUMMARY

Small samples of soil naturally infested by *P. cinnamomi* were exposed in different field situations for varying periods of time. The data indicates that fungal propagules in diseased soil falling on freely drained sites or roads are unlikely to survive the harsh West Australian summers. In moisture gaining sites or where the inoculum is buried, the chances of survival are greater. In the more propitious autumn season, the pathogen survived irrespective of the site on which the samples were placed.

INTRODUCTION

There is plenty of evidence in the Western Australian forests which demonstrates that soil from dieback areas is an effective inoculum for establishing a new infection in a previously healthy site. Considerable weights of soil can be readily transported on logging and other equipment and hygiene prescriptions have been implemented in all forest operations so as to reduce the artificial spread of inoculum to a minimum.

Transport of inoculum is only one facet of the process for the pathogen must be able to survive in its new environment until conditions suitable for infection occur. Controlled experiments from overseas indicate that an uninterrupted drying cycle of two months will severly affect the survival of *P. cinnamomi* in roots and soil. A trial to investigate the ability of this pathogen to survive our generally hot and dry summers was therefore established in November, 1969.

METHOD

Soil was collected from an active dieback gully near Dwellingup. This lateritic silt was baited to establish the presence of *P. cinnamomi* and 100 gram samples of soil and roots were then placed in bags made from 95 percent sarlon shadecloth. The moist samples were then placed in three ecological situations (road surface, ridge top site and valley bottom site) in the months of November, January and May.

The samples placed in January and May were kept moist in the Como shadehouse until ready for use. All sample bags were collected during June and baited for the presence of P. cinnamomi using the lupin technique of Chee and Newhook. In a separate trial, samples were placed in the field in November and treatments were removed and baited in the months of March, May and June. In the ridge top and valley bottom sites, half the samples were placed on the soil surface and the other half were buried at a depth of three inches. Four replicates of each treatment were used throughout the experiment. At monthly intervals between November and June, temperature and moisture data was recorded for each of these sites.

RESULTS

The lateritic silt yielded good recoveries of the pathogen at the commencement of the trial. Monthly temperature measurements indicated that the samples placed on the road were subjected to extremely high temperatures during the day. During the summer months from December to April the recorded temperatures at 10 a.m. ranged from 30°C to 48°C. In contrast the soil temperature on the ridge top site at a depth of three inches never exceeded 25°C and fell as low as 17°C. The valley bottom site was approximately 1.5°C cooler still. Moisture data indicated that the samples on the road surface dried out more rapidly and to a lower final moisture content than did those samples on the other two sites.

The recovery of P. cinnamomi from soil and root samples is presented in Tables 1 and 2.

TABLE 1

Recovery of P. cinnamomi, by lupin baiting, from small clods of diseased soil exposed in different ecological situations for varying period of time.

TIME		ECOLOGICAL SITUATION				
PLACED	BAITED	ROAD SURFACE	RIDGE TOP (Soil surface)	VALLEY BOTTOM (Soil surface)	RIDGE TOP (buried at 3" depth)	VALLEY BOTTOM (buried at 3" depth)
Nov.	June	0/4	0/4	0/4	1/4	1/4
Jan.	June	0/4	0/4	1/4	2/4	3/4
May	June	4/4	2/4	3/4	3/4	3/4

TABLE 2

Recovery of P. cinnamomi, by lupin baiting, from small clods of diseased soil exposed in different ecological situations for varying periods of time.

TIME		ECOLOGICAL SITUATION		
PLACED	BAITED	ROAD SURFACE	RIDGE TOP (buried at 3" depth)	VALLEY BOTTOM (buried at 3" depth)
Nov.	March	0/4	2/4	2/4
Nov.	May	0/4	2/4	1/4
Nov.	June	0/4	1/4	1/4

The recoveries of P. cinnamomi from clods of diseased soil indicate that the survival of the pathogen is highly dependent both on the season and on the ecological situation where the inoculum is placed. There is an obvious trend in the data which indicates an inter-action between site and season. During the more suitable autumn season, the pathogen could be recovered irrespective of the site on which it was placed. During the hot dry summer months, survival of P. cinnamomi was affected, even in the more ecologically suitable sites. The fungus could not be recovered from samples placed in a harsh site for even part of the summer.

The Data in Table 2 supports these trends. Where samples were buried at three inches depth, the pathogen was able to survive right through the summer, albeit at reduced levels. No recoveries could be obtained from any samples which were exposed on a road surface during the summer months.

DISCUSSION

This data is not presented as an argument against carrying out hygiene operations during the summer months. In fact, to relax hygiene regulations during this time of the year would be most unwise. Obviously these results could be influenced by seasonal differences from year to year and some survival during an unusually wet summer or during a wet spell in a normal summer could still occur.

Nonetheless, the data suggests that a number of sites in the northern Jarrah forest are not propitious for the survival of P. cinnamomi during the hot dry summer months which are a feature of our climate. Temperature and moisture regimes and length of exposure appear to be significant factors affecting fungal survival.

If these factors are considered in the planning and execution of Management programmes in the forest area, then the chances of implementing a successful hygiene programme are markedly increased.