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TEMPERATURE CHANGES RESISTANCE OF *EUCALYPTUS MARGINATA* TO *PHYTOPHTHORA CINNAMOMI*

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INTRODUCTION

Eucalyptus marginata (jarrah) varies in its resistance to infection by the introduced pathogen, *Phytophthora cinnamomi* (1). This trait has been exploited to yield jarrah clones ranging in resistance to *P. cinnamomi* (2). However, isolates of *P. cinnamomi* vary in their capacity to induce disease in resistant jarrah clones (3). We have shown that isolates differ in their growth rates in jarrah and marri (*E. calophylla*) tissue and in agar media. Disease outbreaks in jarrah, other native vegetation and horticultural crops due to *P. cinnamomi* are more likely to occur in warm moist conditions. These factors raise questions about the interactions between the pathogen, hosts and temperature, and the consequent disease development.

MATERIALS AND METHODS

To assess the durability of resistance in jarrah at different temperatures, disease development in three jarrah clones caused by *P. cinnamomi* was measured at 15, 20, 25 and 30 °C. Two clones from the selection programme designated resistant (1J30, 121E47) and one as susceptible (11J402; 2) were selected. There were ten replicates of each one-year-old, potted clone per treatment. A pathogenic isolate of *P. cinnamomi*, selected on the basis of previous experiments, was underbark inoculated on the stem 5 cm from the soil surface. Survival was monitored. Stems were then plated onto a *Phytophthora*-selective agar medium to confirm the presence of *P. cinnamomi*. The experiment was terminated after 80 d and surviving plants were given that score.

The effect of temperature on the isolate of *P. cinnamomi* was also assessed. Radial growth was measured on potato dextrose agar (PDA) at 4 °C increments from 12-32 °C.

RESULTS

On PDA, the growth rate of the *P. cinnamomi* isolate was minimal between 12-16 °C, increased with increasing temperature from 16-28 °C and declined thereafter (Figure 1).

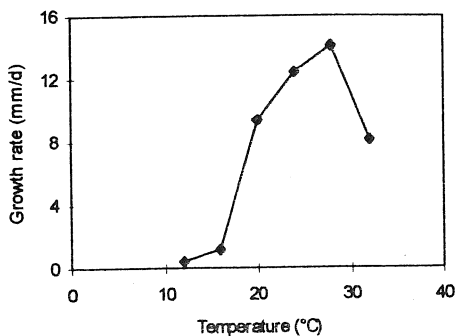


Figure 1. Growth rate of the *Phytophthora cinnamomi* isolate on potato dextrose agar at various temperatures.

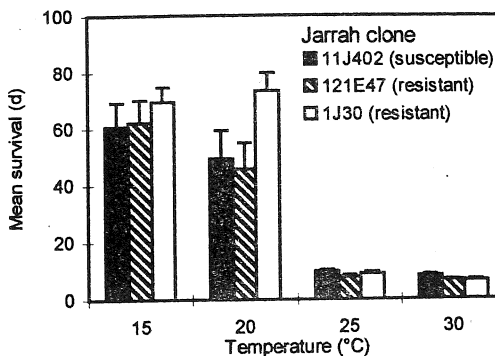


Figure 2. Effect of temperature on survival of *Eucalyptus marginata* clones inoculated with a pathogenic *Phytophthora cinnamomi* isolate. Lines on bars are S.E.M.

Phytophthora cinnamomi was recovered from all dead plants. At high temperatures (25 and 30 °C), survival of all clones was low in comparison to that at low temperatures (15 and 20 °C) where survival was significantly higher (Figure 2). The susceptible clone survived 1-2 d longer than both resistant clones at the high temperatures. While at low temperatures, there was no difference between the susceptible clone and 121E47. However, 1J30 survived about 7 and 20 d longer than the susceptible clone at 15 and 20 °C, respectively.

DISCUSSION

At high temperatures, disease expression was more rapid and pathogen growth was faster. There also appears to be a direct effect of temperature on host resistance since the susceptible clone survived longer than the resistant clones at high temperatures. These results raise the question as to whether temperature has a direct effect on host resistance to *P. cinnamomi*. However, we will be investigating this effect with more isolates of *P. cinnamomi*.

REFERENCES

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