DNA BASED DETECTION OF FOREST PATHOGENS

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ABSTRACT

Western gall rust, caused by *Endocronartium harknessii* (syn. *Peridermium harknessii*), and pitch canker, caused by *Fusarium circinatum*, are serious pathogens of *Pinus radiata* in California and are viewed as threats to *P. radiata* in New Zealand. Forestry is the third largest export earner and a very important part of the New Zealand economy; therefore, protection of the forest estate from exotic forest pathogens is critical. The advent of the polymerase chain reaction (PCR) has allowed the development of novel DNA markers for these pathogens. PCR markers are ideal for pathogens such as rust fungi that are difficult, or impossible, to culture using traditional methods as well as fungi that are difficult or time consuming to identify using culture based morphological techniques. The DNA marker for *E. harknessii* allows identification of the pathogen within non-sporulating galls, thus speeding the identification process and thereby increasing the probability of eradication should the pathogen arrive in New Zealand. The identification of *F. circinatum* is also speeded using DNA based methods. The absence of chlamydospores is one of the diagnostic characteristics of *F. circinatum*, and cultures must be left for a minimum of 28 days to be sure chlamydospores are not produced. Using DNA markers for *F. circinatum*, it is possible to identify the pathogen in a single day. The development of novel PCR based markers is time consuming and requires access to a large DNA collection for empirical testing; however, once a robust system is developed, it is possible to screen large numbers of samples very quickly. DNA based markers should be viewed as a supplement to traditional diagnostic techniques, not as a replacement. As demonstrated by the use of the PCR technique developed at Ensis to identify *F. circinatum* on imported Douglas-fir scion material in quarantine in New Zealand (the material was subsequently destroyed), the utility of DNA based methods cannot be understated.