

Ecological Challenges To The Monterey Pine Forest

Pitch canker was first recognized as a cause of mortality of Monterey Pine in 1986 and spread rapidly, reaching all three native California stands by 1992. It has now also affected Knobcone Pine, Bishop Pine and Douglas Fir. Plots to monitor the development of the disease on the Monterey peninsula were established in 1996 and its severity increased dramatically for the next three years. Studies showed that disease incidence and severity are much greater at lower elevations very near the coast than at inland locations, which reflects an environmental limitation on the disease.

The pitch canker pathogen originated in the southeastern U.S., and was most likely transported to California on contaminated seed. The rapid expansion of the pitch canker infestation in California has been greatly facilitated by native insects such as twig beetles, engraver beetles and cone beetles and, in some areas, spittlebugs. These insects both carry the pathogen and make wounds in the trees which allows the pathogen to infect the trees.

As the disease progressed two forms of resistance were revealed: inherent genetic resistance and systemic induced resistance. Testing showed that pines differ by genotype in their susceptibility to the disease independent of environmental conditions. Controlled studies also showed that some trees became more resistant to pitch canker following repeated exposure to the pathogen, a phenomenon known as systemic induced resistance (SIR), a response not previously documented to occur in trees. Field observations on resistance suggested that disease remission of pitch canker occurs under natural conditions as well.

Disease remission was documented in planted stands of Monterey Pine where trees that were heavily diseased in 1996 were found free of disease in 1999. Absence of symptoms reflected the loss of old infections, probably as old branches broke off and new growth supplanted the former branch leader, thus producing a distinctive growth form which is characteristic of trees in remission.

Management of pitch canker has focused on minimizing the movement of infected host materials, developing pitch canker resistant planting stock, and other replanting strategies. To maintain the character of the native forest, Monterey Pines can be replaced by planting either resistant trees at lower densities or unscreened seedlings at higher densities taking advantage of the species' inherent genetic resistance. Commitment to minimizing movement of infected materials and encouraging both natural regeneration and replacement tree plantings should allow the forest over time to adapt to the pitch canker pathogen.

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