The resistance factors of Japanese red pines to pine wilt disease

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Pine wilt disease severely damages pine forests in Japan. Most of Japanese red pines are susceptible to pine wilt disease, but some of them are resistant. The mechanisms of the resistance are little clarified. The goal of this study is to know the factors of the resistance in Japanese red pines to pine wilt disease.

We inoculated a virulent isolate of pinewood nematodes to two resistant lines of Japanese red pine and susceptible pines. The pinewood nematodes were harder to migrate in the resistant pines than the susceptible ones. Anatomical analysis of the pines inoculated with the pinewood nematodes showed that the resistant pines had the smaller number of cortical resin canals than the susceptible pines. Moreover, tissue damage progression by the nematodes was inhibited in the resistant pines, probably by the resistant responses of the resin canals. Extracts from the resistant pines had higher effects on the immobilization of the nematodes. These results indicated that inhibition of pinewood nematode migration is a key factor for resistance to pine wilt disease. Furthermore, they suggested that the migration was inhibited by the integration of the feature of cortical resin canals, cell responses and chemical components in resistant pines.

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