Investigating Canker Diseases of Pistachio in California

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INTRODUCTION

During recent surveys, we detected several new canker pathogens of pistachio in California. Symptoms included wood discoloration and branch dieback. Canker diseases occurred mainly in older pistachio orchards but also were found, on occasion, in young orchards. Main fungal pathogens identified from cankers included six *Cytospora* species*, Neofusicoccum mediterraneum, Diaporthe ambigua (=Phomopsis ambigua)*, *Schizophyllum commune*, *Phaeoacremonium mortoniae, Phoma* sp.*, Colletotrichum karstii* and *Phytophthora* species. The objectives of this study were to investigate the biology of these newly detected pathogens, assess their severity and evaluate the threat they may pose to pistachios. In 2017, we conducted experiments to determine the ability of these fungi to cause canker diseases. An additional goal was to determine and compare the susceptibility of the three main pistachio cultivars—Golden Hills, Lost Hills and Kerman—to canker pathogens. Pathogenicity studies were conducted in the field at the Kearney Agricultural Research and Extension Center (KARE) using a selection of fungal species previously isolated from diseased trees and inoculated in twigs of 10-year-old pistachio trees. This year we completed a three-year study that aimed to identify and characterized fungal pathogens associated with canker diseases of pistachio.

RESULTS

Results of pathogenicity studies showed that all species tested were able to produce lesions and vascular discolorations in the wood of pistachio just a few months after infection. All fungal treatments produced cankers that were significantly longer than the control, suggesting that all fungi tested are pathogenic to pistachio. This work revealed also that all three scion cultivars, including Golden Hills, Lost Hills and Kerman, were equally susceptible to canker pathogens. All fungal isolates were recovered at a significant distance from the inoculation point, showing their ability to colonize and infect the wood of pistachio. *Diaporthe (Phomopsis) ambigua*, *Schizophyllum commune*, *Phaeoacremonium mortoniae, Phoma* sp. and *Colletotrichum karstii,* tested in this study, appeared moderately virulent in all 3 pistachio cultivars and were only detected sporadically in pistachio, in California. Therefore, these fungi are not considered a major threat to pistachio. On the other hand, *Cytospora eucalypticola* and *Neofusicoccum mediterraneum* were particularly virulent in pistachio, causing substantial cankers and dieback symptoms. *N. mediterraneum* and *Cytospora spp.* were also the most frequent canker pathogens isolated in our study, and were rather common in mature pistachio orchards. *Cytospora* species have been largely recognized as severe canker pathogens worldwide, and can be devastating to perennial crops. *N. mediterraneum* was reported as an aggressive canker pathogen of English walnut, almond and olive, in California, causing twig and branch dieback. Results from this study revealed also that inoculation of pistachio twigs with *Phytophthora* species resulted in severe aerial or perennial canker, killing rapidly entire scaffold branches. All *Phytophthora* species appeared pathogenic in Golden Hills, Lost Hills and Kerman scion cultivars. Although sporadic, canker diseases of pistachio must be monitored carefully in California, as stress caused by drought can contribute to an exacerbation of canker diseases. It

has been also common knowledge that trees subjected to any type of stress become more susceptible to infection by canker pathogens. The occurrence of similar fungal pathogens in almond and walnut, in California, have been on increasing concern in recent years, and specific control measures are being investigated in these crops to mitigate the impact of canker diseases.

CONCLUSION AND APPLICATIONS

Several new canker pathogens of pistachio were detected and identified in California. Canker diseases were mainly restricted to older pistachio orchards, but occasionally occurred in young orchards. All fungal species tested were pathogenic to pistachio, causing extensive lesions and vascular discolorations just a few months after inoculation. Species of *Cytospora* and *Neofusicoccum mediterraneum* were the most common canker pathogens isolated from pistachio, and appeared highly virulent to this host, causing substantial cankers and dieback symptoms. *Phytophthora* species can cause aerial or perennial cankers in pistachio. All three scion cultivars, including Golden Hills, Lost Hills and Kerman, were equally susceptible to canker pathogens. This work exposed the occurrence of new and aggressive fungal pathogens of pistachio, in California, and we recommend careful monitoring of orchards for the detection of possible spread and amplification of these new diseases.