

Distribution of Two Species of Phytophthora Within the Citrus Acreage in Arizona

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ABSTRACT

Phytophthora citrophthora and P. parasitica cause gummosis and root rot of citrus trees in Arizona. A disease survey was initiated to determine the relative distribution of each pathogen within the citrus acreage of Maricopa and Yuma Counties. Both pathogens were recovered at the same time from 75% and 17% of orchards containing Phytophthora in Maricopa and Yuma County, respectively. P. citrophthora alone was found in 15% of the groves containing Phytophthora in Yuma County, while P. parasitica alone was detected in 25% and 68% of the citrus plantings containing Phytophthora in Maricopa and Yuma County, respectively. This survey will be continued for another year. The potential value of this information for improved disease control is discussed.

INTRODUCTION

Phytophthora gummosis and root rot of citrus is a serious and widespread disease problem in Arizona. Disease incidence is especially high in groves established with the graft union at or below the soil surface, exposing susceptible scion tissue to the pathogen. Severe losses can also occur in groves subjected to flood-irrigation as well as in plantings on susceptible rootstocks.

Phytophthora citrophthora and P. parasitica are the two pathogens causing gummosis and root rot of citrus in Arizona. The optimum temperature for growth of P. citrophthora is 75-82 degrees Fahrenheit, while P. parasitica grows best at 86-90 degrees Fahrenheit. To achieve the maximum level of disease control, fungicides should be in place when the pathogen is active. Since each species of Phytophthora has different temperature limits for growth, it is necessary to first identify the pathogen causing gummosis or root rot before applying a fungicide or other disease control measure. The purpose of this study was to determine the relative distribution of each species of Phytophthora present in citrus groves of Arizona.

MATERIALS AND METHODS

Citrus groves in Yuma and Maricopa Counties were surveyed for the presence of Phytophthora. Within each grove, from one to 10 trees were sampled. Isolations were made from decayed root and bark tissues, and from soil surrounding diseased citrus trees. Small pieces of decayed bark or roots were washed, then plated onto a selective agar medium for recovery of Phytophthora. Isolation of Phytophthora from soil was achieved by collecting soil within the drip line of each citrus tree and placing the soil in a container in the laboratory. Two Bartlett or Anjou pear fruits were placed on the surface of the soil, and enough water was added to cover the soil with 1 inch of water. After incubation for 48 hr at 70-75 degrees Fahrenheit, the fruits were removed from the soil, washed, and incubated for an additional 24-72 hr at 75 degrees Fahrenheit. Firm brown spots developed on the pear fruits invaded by Phytophthora. When a small piece of this brown tissue was placed on selective agar medium, Phytophthora grew from the fruit tissue and the identity of the pathogen was determined.

RESULTS AND DISCUSSION

The results of this disease survey, through September, 1988, are listed below.

		Yuma County	Maricopa County
Number of groves sampled		51	12
Number of groves yielding:	<u>P. citrophthora</u>	6	0
	<u>P. parasitica</u>	28	3
	Both pathogens	7	9
Number of trees sampled		165	67
Number of trees yielding:	<u>P. citrophthora</u>	11	14
	<u>P. parasitica</u>	84	24
	Both pathogens	6	13

Considering both Maricopa and Yuma Counties, over 84% of all sampled groves contained Phytophthora. On an individual tree basis, Phytophthora was recovered from approximately 65% of all tested trees.

The results of this disease survey suggest that P. citrophthora and/or P. parasitica are present in a high percentage of declining citrus groves in Arizona. Phytophthora parasitica appears to be the major species in Yuma County, while both P. citrophthora and P. parasitica were isolated frequently in Maricopa County. These are preliminary results, as we intend to continue this disease survey for another year.

The completed disease survey will give us a comprehensive picture of the distribution of the two species of Phytophthora within the citrus acreage in Arizona. This survey is part of a broader research program to develop more effective disease management strategies for control of Phytophthora gummosis and root rot of citrus. The goal of this research program is to achieve maximum disease control for the least economic cost.

Precise timing of fungicide applications is one part of this program. If only one species of Phytophthora is present in a grove, fungicide applications can be timed to insure that maximum fungicidal activity is present when the pathogen is most active. Approximately 70% of the citrus groves from which Phytophthora was isolated contained only one of the pathogens.