

# Seasonal Variation in Susceptibility of Citrus Rootstocks to *Phytophthora*

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## ABSTRACT

*Phytophthora parasitica* and *P. citrophthora* are routinely recovered from diseased citrus groves in Arizona. Stem sections were collected monthly from *Citrus macrophylla*, rough lemon, sour orange, Cleopatra mandarin, Troyer citrange and *Citrus volkameriana*. Stem pieces were wounded, inoculated with mycelium of *P. parasitica* or *P. citrophthora*, then incubated for 7 days at 21° C in moist chambers. For all tested rootstocks, the smallest cankers were produced on tissue collected in December, January and February, the winter dormancy period for citrus in Arizona. The period of higher susceptibility ranged between March through November, depending on the rootstock tested. Apparently, these six citrus rootstocks possess seasonal differences in their susceptibility to *P. parasitica* and *P. citrophthora*.

## INTRODUCTION

Phytophthora root and crown rot is a destructive soil-borne fungal disease found wherever citrus is grown in Arizona. Destruction of the roots and trunk of citrus trees results in increasing yield loss and eventual tree death.

Plant disease results from the interaction between (1) a susceptible host, (2) a pathogen and (3) an environment conducive to disease development. Disease control strategies involve modifying one or more of these parameters to reduce the incidence and severity of disease.

The purpose of this research project was to examine the first requirement for plant disease, the susceptible host. Apple and walnut bark tissues are known to be least susceptible to *Phytophthora* when the trees are dormant and most susceptible when the trees resume active growth in the spring (1,2). The question is: do citrus rootstocks also show a seasonal variation in susceptibility to *Phytophthora*? If differences in susceptibility to *Phytophthora* do exist, then more precise timing of fungicide applications could significantly increase the level of disease control in citrus groves.

## MATERIALS AND METHODS

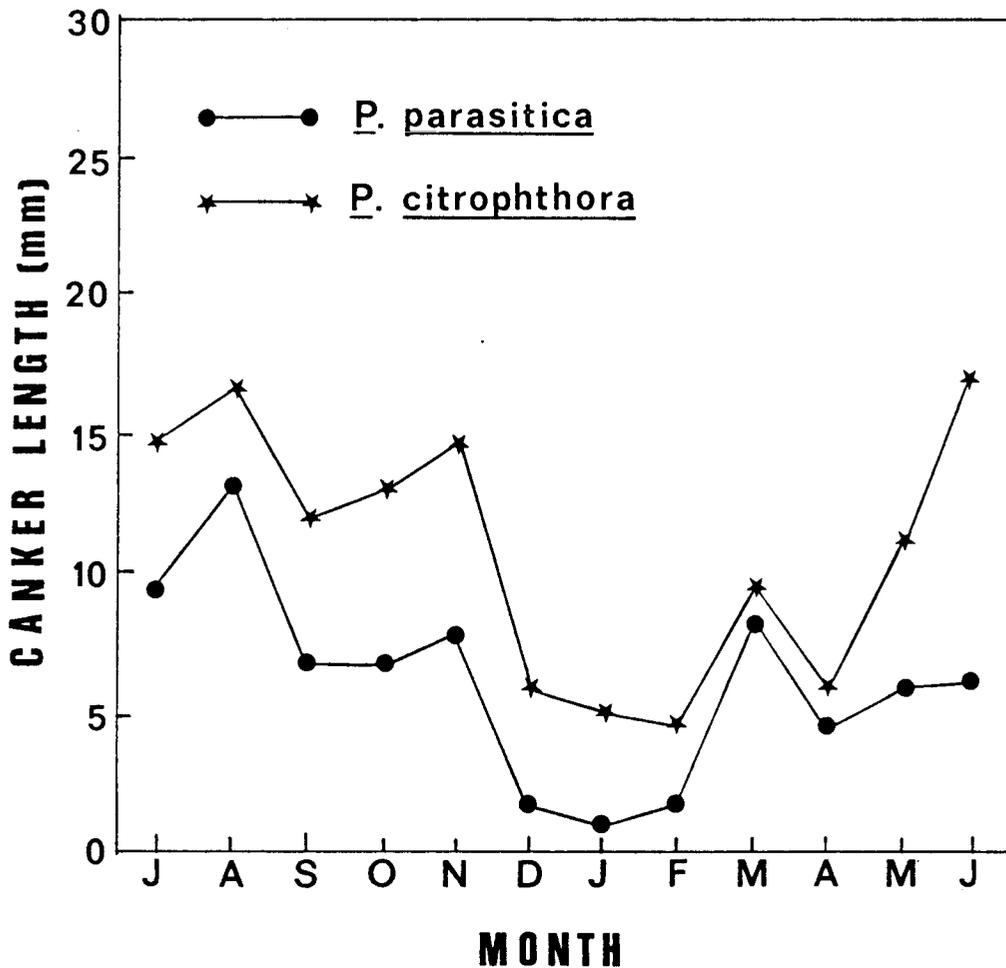
In this study, 20 stem pieces (3 inches long) from each of 6 different citrus rootstock trees were collected, wounded with a cork borer, then inoculated with mycelial disks of either *Phytophthora citrophthora* or *P. parasitica*. Both of these *Phytophthora* species cause root and crown rot of citrus in Arizona. The inoculated stem pieces were then incubated for 7 days at 21° C in moist chambers, after which the lengths of resultant stem cankers were recorded. This procedure was repeated monthly during 1985 and is continuing through 1986. Citrus rootstocks tested were:

1. Rough lemon (Citrus jambhiri)
2. Citrus macrophylla
3. Sour orange (Citrus aurantium)
4. Cleopatra mandarin (Citrus reshni)
5. Citrus volkameriana
6. Troyer citrange (Citrus sinensis x Poncirus trifoliata)

### RESULTS AND DISCUSSION

The severity of disease induced by Phytophthora citrophthora and P. parasitica during 1985 is summarized in Figure 1. Disease severity was determined by length of stem cankers developing 7 days after inoculation.

Figure 1. Monthly susceptibility of 6 citrus rootstocks to Phytophthora.



Considering the combined data for all 6 tested rootstocks (Figure 1), disease severity was lowest in December, January and February. During this period of time, citrus is "dormant" or not actively growing in Arizona. Disease severity was generally higher from March through November, when active shoot growth occurs.

Each individual rootstock displayed the same trend illustrated in Figure 1: that is, lowest disease severity occurred in December, January and February, while high levels of disease occurred during periods of active shoot growth.

This research demonstrates the existence of seasonal variation in susceptibility of citrus rootstocks to invasion by Phytophthora. This information can be used for precision timing of fungicide application to assure adequate protection of citrus trees when they are most vulnerable to attack by Phytophthora. More effective disease control will result in increases in yield quality and quantity.

## REFERENCES

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