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EPIDEMIOLOGY AND DYNAMICS OF PHYTOPHTHORA ROOT ROT OF AVOCADO AS AFFECTED BY ROOTSTOCK, SOIL, IRRIGATION AND FUNGICIDES

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Root rot, caused by Phytophthora cinnamomi, is the major disease limiting avocado production in southern California. The use of disease resistant or tolerant rootstocks is a major means of dealing with this problem. Thus, the reliable evaluation of rootstocks for disease resistance is of utmost importance. The effects of soil, irrigation, and fungicides on this resistance have not been defined but are essential to understanding the field performance of these rootstocks.

Epidemiology is the study of the increase and spread of disease in plant populations as influenced by the pathogen, the host, and the environment. Establishment of the relationship between the initial level of inoculum of the pathogen and subsequent disease development under different field conditions is an important epidemiological criterion for the evaluation of disease resistance and other measures for control of soilborne plant pathogens. Current methods used to assess resistance to root rot rely upon the use of abnormally high levels of inoculum. These levels do not necessarily reflect those encountered under actual field conditions, nor are the rootstocks subjected to soil and water stresses known to affect adversely the expression of resistance. Furthermore, inoculum in the field is likely to occur in clumps rather than to be dispersed uniformly throughout the soil. Thus, restriction of the ability of the pathogen to spread throughout the root system from initial sites of infection is a potentially important component of resistance which could also be considered.

The objective of this project is to examine the effects of soil and irrigation stresses on the population dynamics of P. cinnamomi. on the spatial and temporal development of Phytophthora root rot, and on the evaluation of root rot resistance in avocado. This will be accomplished through (i) establishment of relationships between initial density of inoculum and subsequent disease development, (ii) evaluation of the influence of disease-conducive and suppressive soils on the dynamics of avocado root growth and root rot development, (iii) evaluation of the influence of stresses imposed by drought and flooding on rootstock resistance, and (iv) determination of the rate of spread of the pathogen within individual root systems of various avocado rootstocks.

An experiment is in progress to meet the first of the specific objectives. Two hundred and twenty-five seedlings of the susceptible rootstock, Topa Topa, were planted into soil infested either with chlamydospores of P. cinnamomi at levels of 0.1, 0.5, 1.0, 5.0 or

10.0 chlamydospores per gram soil or with colonized millet at levels of 0.1, 0.5 or 1.0 % per gram soil (w:w). Determinations of fresh root and shoot weights, root lengths, percentages of the root systems colonized by the pathogen, and rhizosphere populations of the pathogen are being made on each of five plants per treatment at 2, 3, 4, 6 and 8 weeks after transplanting.