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COMMON ROOT PATHOGENS FROM AVOCADOS

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OPSOMMING

Gereelde isolasies is van avokadowortels en van die grondin die omgewing van die wortels gemaak. Behalwe Phytophthora cinnamomi, *wat besonder gereeld voorkom en die hoofoorsaak van wortelvrot is, net 'n aantal potensiele patogeniese swamme voorgekom. Hoewel hierdie swamme skynbaar nie tans probleme gee nie, moet 'n waaksame oog op hulle gehou word as selektiewe chemiese behandelings in die toekoms vir die beheer van* P. cinnamomi *gemaak word.*

INTRODUCTION

The best known and most devastating fungal pathogen of avocado roots is *Phytophthora cinnamomi,* first reported in Puerto Rico by Tucker (1928). Other soil-borne pathogens from avocados include *Verticillium albo-atrum* (Zentmyer, 1949), *Armillaria mellea* (Smoyer, 1941), *Rhizoctonia solani* (Mircetich & Zentmyer, 1964), *Rosellinia necatrix* (Raabe & Zentmyer, 1955), *Sclerotium rolfsii, Sclerotium sclerotiorum* + *Clitocybe tabescens* (Wehlburg, Alfien, Langdon & Kimbrough, 1975). *Phytophthora palmivora* (Conover, 1948; Zentmyer, 1959), *P. parasitica* (Stevens & Piper, 1941) and *P. citricola* (Zentmyer, Jefferson & Hickman, 1972) were mostly isolated from cankers and they seem to be less important root pathogens than *P. cinnamomi.*

This study was conducted to find out which pathogenic fungi occur on avocado roots or ¡n the root zone. Previous investigations indicated that *Pythium* spp. may be important pathogens in the avocado root rot syndrome and special attention was given to this genus.

MATERIALS AND METHODS

Isolation techniques and media relating to *P. cinnamomi* investigations were used. Generally PDA was used as a non-selective medium and $P_{10}VP$ as a selective medium for the Phycomycetes.

Organisms were sub-cultured, classified into homogenous groups and identified. All *Pythium* and *Phytophthora* species were confirmed or identified at the Commonwealth Mycological Institute, Kew, England. Isolations of these fungi were made parallel to *P. cinnamomi* from established orchards mostly on clay soils of Westfalia Estate.

In addition to the pathogenic fungi, a large number of saprophytic species belonging to some 16 different genera were isolated. *Mortierella,* especially was abundant in decomposing avocado roots. *Phytophthora cinnamomi* seemed to be the most common and widespread pathogenic organism recovered from the root zone and dead roots of avocados in the orchards of Westfalia Estate.

Pythium debaryanum was more often isolated from both soil and roots than any other *Pythium* sp. However, in the high lying acid soils *P. spinosum* occurred most frequently.

P. myriotylum was more prevailent in the lupine seedlings from lower regions with a higher pH. *P. ultimum* occurred less commonly in the soil and roots. *P. splendens* was often isolated from roots. *P. irreguläre* and *P. acanthicum* were uncommon.

Cylindrocarpon destructans and *Fusarium oxysporum* were frequently found in the root zone as well as the roots. *F. moniliforme* was less frequently isolated. Little is known about *Cylindrocladium parvum* as a pathogen but it was often isolated from soil and roots, while *C. scoparium* appeared only a few times. *Rhizoctonia solani* was often found in most of the orchards. The *Verticillium* sp. was not *alboatrum* and occurred seldom.

RESULTS

TABLE 1: Pathogenic fungi isolated directly from avocado roots and from the root zone by using the lupine seedling bait technique

Fungi from soil after attacking lupine seedlings:	Fungi isolated direct from diseased avocado roots:
Phytophthora cinnamomi	*Phytophthora cinnamomi*
Pythium acanthicum	*Pythium debaryanum*
Pythium debaryanum	*Pythium irregulare*
Pythium myriotylum	*Pythium splendens*
Pythium spinosum	*Pythium ultimum*
Pythium splendens	*Cylindrocarpon destructans*
Pythium ultimum	*Cylindrocladium parvum*
Cylindrocarpon destructans	*Cylindrocladium scoparium*
Cylindrocladium parvum	*Fusarium oxysporum*
Fusarium oxysporum	*Fusarium moniliforme*
Verticillium sp.	*Verticillium* sp.
	Macrophomina phaseolina

DISCUSSION AND CONCLUSION

During the course of studying the major root rot fungus, *Phytophthora cinnamomi,* at least 15 other potentially pathogenic fungi were isolated from avocado roots or root zones. Most of these fungi are pathogenic on the roots of other host plants. Concluding from the frequency of these organisms none of them play an important role in the root rot syndrome of avocados under Westfalia conditions.

It should be noted, however, that selective chemical applications for the control of *Phytophthora cinnamomi* may easily upset the existing balance. It is strongly

recommended that regular surveys of this nature be carried out in future.

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