

PRELIMINARY STUDIES ON THE ASSOCIATION OF
FUSARIUM EQUISETI (CORDA) SACC AND
CYLINDROCARPON EFFUSUM BUGN WITH COCONUT
ROOT (WILT) DISEASE

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ABSTRACT

Root decay is often found to be associated with Coconut root (wilt) disease. Evidences suggest the association of some fungi in causing root damage.

Recently *Fusarium equiseti* and *Cylindrocarpon effusum* were isolated from apparently healthy roots of root (wilt) affected and also apparently healthy palms of diseased tract. Pathogenicity trials indicated the ability of these fungi to cause internal damage prior to the development of external symptoms in roots as evidenced by the derangements observed at the stelar region. As the infection progressed, acute symptoms were noticed, exhibiting black necrotic patches on the mature roots and also rotting of the root tip. The number of rotted roots increased as the period of incubation prolonged resulting in a deteriorated root system as occurring in root (wilt) affected palms.

INTRODUCTION

Damage of the root system was found to be closely associated with the coconut root (wilt) disease (Butler, 1908; Menon et. al, 1949; Naga Raj and Menon, 1955; Michael, 1964). The association of fungal organisms like *Botryodiplodia theobromae* (Butler, 1908), *B. theobromae*, *Rhizoctonia solani* and *Rhizoctonia bataticola* (Menon and Nair, 1949; Radha and Menon, 1954; Lily, 1960) were also reported with the disease. Derangements of the stelar tissue (Indira and Ramadasan, 1968) and the presence of *Cylindrocarpon effusum* and *Fusarium equiseti* in apparently healthy palms (Thomas Joseph, 1978) were also observed. Occurrence of these fungi were reported to be significant in palms of different stages of root (wilt) disease (Lily, 1978). Object of the present study is to enlighten the possible role of these organisms with the root damage commonly associated with coconut root (wilt) disease.

MATERIALS AND METHODS

Pathogenicity test

Coconut seedlings were raised in sterilized soil, filled in reinforced concrete pots. Coconut root bits about 2 cm size (150 gm per 500 ml conical flasks) were sterilized at 20 lbs pressure for 30 minutes and the organisms were multiplied in those flasks for inoculating the seedlings. Three weeks old cultures of the fungus (300 gm per seedling) were added to the root zone of the seedlings at monthly intervals for a period of two years and five replications were maintained for each organism. Roots were collected at weekly intervals for the development of symptoms and for reisolation of the organisms. The root system of the inoculated as well as control seedlings were exposed completely after a period of 2 years and 9 months to study the effect of fungal infection.

RESULTS AND DISCUSSION

Examination of the individual roots revealed that the entry of both the fungi were effected inside the stelar tissue after a period of 42 to 45 days without showing any visible external symptoms. Root sections stained with lacto-phenol-cotton blue clearly brought out fungal ramifications and the test organisms were reisolated from the stelar tissue. Discolouration both in the cortical and stelar tissue was also noticed subsequently. Complete rotting from the root tip was observed only after a period of 60 to 65 days and above. Secondary branch developed from just behind the rotted portion also decayed in due course.

A critical study was made on the nature of damage of the root system of inoculated seedlings after a period of 2 years and 2 years 9 months of inoculation period as compared to that of uninoculated seedlings (check plants). One seedling from each treatment was subjected to this kind of observation. There were black necrotic patches on the mature roots mainly at the region of formation of breathing pores, branching of rootlets and also at the root tip. Majority of the surface feeders were rotten and thus found lesser in number. Observations indicated that there was 20.0 per cent root rot in *F. equiseti* inoculated

seedling, 13.5 per cent in *C. effusum* treated seedling as against 5.0 per cent rotting in the uninoculated check plants after 2 years. The same was found to increase to 34.3 per cent for *F. equiseti*, 69.8 per cent for *C. effusum* while that of check plants was only 3.0 per cent after 2 years and 9 months (Table 1).

Table 1. Extent of damage on the root system.

Incubation period	<i>Fusarium equiseti</i>		<i>Cylindrocarpon effusum</i>		Control	
	Total roots	Percentage of rotted roots	Total roots	Percentage of rotted roots	Total	Percentage of rotted roots
2 years	81	20.0	66	13.5	61	5.0
2 years						
9 months	93	34.3	126	69.8	141	3.0

Cylindrocarpon spp. were reported to be disease inciting in some of the cultivated crops, causing severe root damage, resulting in the death of the affected plants (Ylimake, 1967; Prasad and Bilgrami, 1972). *Cylindrocarpon* was also reported to be associated with leaf scorch disease of coconut in Ceylon (Ekanrijka, 1964). Subsequent to root infection by *C. tenue* on coffee (Subramanian and Govindarajan, 1968) the plants died after exhibiting foliar symptoms. *F. equiseti* was known to be toxin producing in soyabean, red and white clover and pea resulting in the death of plants (Janch *et al*, 1975) and also the causal agent of tuber rot in *Cycas* (Subramanyan *et al*, 1974).

The present study clearly indicates that *C. effusum* and *F. equiseti* are pathogenic on coconut root and are capable of producing damage to the roots of coconut seedlings as in the root (wilt) diseased palms in the field. The role of these fungi in inducing/aggravating root (wilt) disease by initiating root damage leading to the expression of foliar symptoms of the disease is under investigation.

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