

TREND IN YIELD OF ROOT (WILT) AFFECTED COCONUT PALMS (*COCOS NUCIFERA* LINN.)*

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ABSTRACT

Correlation and regression studies were carried out on yield and disease index of root (wilt) affected coconut palms. The significant negative correlations obtained between yield and disease index revealed the debilitating impact of the disease on yield. Regression equations fitted on data collected from 500 palms aged above 30 years in the farmer's field showed an average reduction of 0.5 nuts per index while it was 1.3 nuts per index for the younger palms (aged below 13 years) under the well managed farm conditions. This indicates that the impact of disease is more in the case of palms which contract disease during the early years of bearing. However, the average yield of the palms under the well managed conditions were consistently high upto the index level of 50 points, showing the effect of good management on maintaining the yield.

INTRODUCTION

The coconut palm (*Cocos nucifera* Linn.) is prone to several maladies of which the root (wilt) disease is the most prominent one, prevalent in the eight Southern districts of Kerala. This disease has attracted the attention of various research and developmental agencies, particularly in view of its impact on the economy of the State. A survey conducted by the Central Plantation Crops Research Institute (CPCRI) in collaboration with seven other state and central agencies revealed the magnitude of the loss which is to the tune of 968 million nuts (Anon, 1985) annually to the State.

Root (wilt) disease, characterised by flaccidity, yellowing and marginal

necrosis in the foliage of palms, is debilitating but not lethal. It occurs in all soil types in varying degrees of intensity. Palms of all ages are susceptible to the disease. However, definite information was lacking about the rate of decline in yield of the affected palms as the disease advances. The present study was intended to work out the trend in yield of the root (wilt) affected palms and to estimate the rate of decline in yield due to the disease.

MATERIALS AND METHODS

A sample of 6 plots consisting 500 palms of all stages of disease were selected in Kayangulam, and its adjoining areas and were kept under observation for a period of two years. Data on yield of the palms were recorded

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by the count of nuts on the crown in six monthly intervals, and the palms were indexed for disease (George and Radha, 1973). Simultaneously, a sample of 550 palms in the CPCRI Farm at Kayangulam, under the well managed farm conditions were also considered for a comparative study. The palms selected in the farmer's fields were aged 30 years and above while those at the farm were aged below 13 years.

Correlation and regression analysis were carried out to study the impact of the disease on yield. Correlation coefficients between yield and disease index were worked out for individual years and also for the pooled data for two years. The palms were then grouped according to the disease indices at 10 point intervals and mean yield for each index group were worked out. Linear regression equation were fitted for the grouped data (Richardson, 1981).

RESULTS AND DISCUSSION

The distribution of the palms according to disease indices is given in Table I.

The table shows that only 15 and 31 per cent respectively of the palms in the cultivator's field and CPCRI Farm are in the index group '0-10', which are considered to be 'apparently healthy' indicating the high incidence of the disease in the selected plots.

Table II gives the correlation coefficients between disease index and yield. The significant negative correlation indicate the debilitating impact of the disease on yield of the palms.

The distribution of the average yield of the palms according to disease index groups are presented in Table III. The results show that there is consistent decline in yield as the disease advances. The age gap between the palms in the farmer's field and those at CPCRI Farm is a limiting factor for an objective comparison of the trend in yield. Ramadasan, Shanta and Lal (1971) recorded that in young palms bearing was often delayed indefinitely and the yields were much less than those palms which became diseased after the onset of flowering.

Table I. *Distribution of the sample palms according to disease index*

Disease index	Number of palms in the sample	
	Farmer's field	CPCRI Farm
0-10	70 (15.1)	169 (31.0)
11-20	55 (11.8)	40 (7.3)
21-30	70 (15.1)	105 (19.2)
31-40	89 (19.1)	116 (21.2)
41-50	96 (20.6)	74 (13.6)
51-60	52 (11.2)	35 (6.4)
61-70	33 (7.1)	7 (1.3)
Total	465 (100)	546 (100)

Figures in parenthesis are percentages over total

Table II. *Correlation coefficients between disease index and yield*

Year	Correlation coefficients	
	Farmer's field	CPCRI Farm
1983-84	-0.6236**	-0.5438**
1984-85	-0.5089**	-0.4283**
Pooled	-0.6178**	-0.5028**

** Significant at $P < 0.01$

In the present study, the palms selected at the farm which are under scientific management contracted the disease during the early years of bearing in contrast to the palms selected at the cultivator's field which became diseased only after the yield was stabilized. Thus, the average yield of the palms in the latter case is expected to be higher as compared to the young palms. However, a perusal of the mean yields of the two sets of palms in the different disease index groups reveals that the mean yields of the younger palms are almost double that of the older palms up the index level of 40. Sahasranaman et al. (1983) reported that the palms in

the early stages of disease responded to better management. This reflected in the higher yields of the well managed palms upto the index level of 40 inspite of a higher rate of decline in yield.

Table IV shows the regression equation fitted for the grouped data. The relations show that the response of yield to disease is linear. The slopes of the regression lines indicate that, on an average, there is a reduction of 0.5 nuts/index in the cultivator's field while it was 1.3 nuts/index at CPCRI Farm. However, the higher average yield of the palms under the scientific management, inspite of the onset of the disease at the

Table III. *Distribution of average yield of palms according to disease index*

Index group	Average yield (nuts/palm)					
	Farmer's field			CPCRI Farm		
	I year	II year	Mean	I year	II year	Mean
0-10	34.8	42.3	38.6	86.3	68.4	77.0
11-20	30.8	35.9	33.3	78.5	57.1	67.8
21-30	26.1	32.8	29.9	60.9	48.0	54.4
31-40	19.7	30.6	25.2	48.6	37.3	43.1
41-50	14.1	22.9	18.5	25.5	19.4	22.5
51-60	10.0	15.6	13.2	12.4	7.9	10.1
61-70	6.8	9.2	8.0	0.1	1.3	0.7
Overall	21.1	28.5	24.9	58.7	45.6	52.8

Table IV. Regression equations of yield on disease index of palms

Year	Regression equations	
	Farmer's field	CPCRI Farm
1983-84	$Y = 37.53 - 0.4943 X, r^2 = 0.9924$	$Y = 97.89 - 1.5221 X, r^2 = 0.9902$
1984-85	$Y = 45.77 - 0.5350 X, r^2 = 0.9732$	$Y = 75.24 - 1.1725 X, r^2 = 0.9902$
Pooled data	$Y = 41.74 - 0.5121 X, r^2 = 0.9944$	$Y = 86.40 - 1.3436 X, r^2 = 0.9908$

early stage of bearing shows the effect of good management on maintaining the yield of the diseased palms.

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