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YIELD AND DRUPE CHARACTERISTICS OF COCONUT PALMS AFFECTED WITH LEAF SCORCH DECLINE

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ABSTRACT

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The yield and drupe characteristics of healthy coconut palms have been compared with those of palms affected by Leaf Scorch Decline which have been grouped into Mild Leaf Scorch Decline, Moderate Leaf Scorch Decline and Advanced Leaf Scorch Decline. Significant reduction in yield and drupe components have been observed in palms showing moderate and advanced Leaf Scorch Decline while the difference in these characteristics between healthy palms and those showing mild Leaf Scorch Decline was not significant.

INTRODUCTION

Leaf Scorch Decline is a disorder of coconut palms observed extensively in the Galle district of Sri Lanka. The history of the disorder and the symptomatology have already been described elsewhere (Ekanayake, 1968; Humphries, 1970).

This condition, first detected in Sri Lanka in 1955, has been observed in palms generally above 20 years of age (Peries, 1968). Maramorosch (1964) has described it as a 'disease of unknown aetiology', along with such coconut diseases as Lethal Yellowing Disease in Jamaica, now believed to be caused by mycoplasma-like organisms (Heinze *et al.*, 1972), Cadang-Cadang disease in the Philippines, where rickettsia-like organisms have been observed in infected tissue (Petzold *et al.*, 1974) and root wilt disease in India where the causal agent is not known. However, unlike some of the diseases of unknown aetiology, the full course of Leaf Scorch Decline takes a longer period of about 2–7 years.

A reduction in yield of palms affected with Leaf Scorch Decline has been noted (Ekanayake, 1968). This paper embodies some work done to assess the reduction in yield and to record the drupe characteristics of palms affected with Leaf Scorch Decline.

MATERIALS AND METHODS

The observations were carried out at Sirikandura Estate in the Galle district of Sri Lanka over a period of about $1\frac{1}{2}$ years. The palms affected with Leaf Scorch Decline were categorized into 3 groups, according to the severity of the condition as follows:

Mild Leaf Scorch Decline. In these palms, scorching of leaflets, extending to about 20-25 cm from the tip, can be seen in about 4 - 5 fronds of the lower-most fronds.

Moderate Leaf Scorch Decline. In these palms, scorching in leaflets is visible up to about 50 cm from the tip. Generally more than 50% of the fronds show scorched leaflets. Initial stages of the tapering of the trunk may be seen.

Advanced Leaf Scorch Decline. Total number and the size of fronds are reduced. All remaining fronds except the newly-opened 2–4 fronds, have scorched leaflets. Tapering of the trunk and reduced number of nuts are noticeable.

According to this classification, 25 palms showing mild Leaf Scorch Decline, 25 palms showing moderate Leaf Scorch Decline and 50 palms showing advanced Leaf Scorch Decline were chosen, care being taken to choose the palms from the same section of the field and the individual palms were numbered for identification. From the same block, 50 healthy palms were selected to be used as a control.

At the harvest, the drupes were numbered and the yield from each palm was recorded. The drupes were weighed individually and the long axis and the short axis were measured using a sorting frame as described by Nathanael (1959).

Drupes ('Nuts') were husked and weighed after they had been withered and seasoned for 30 days in the field. The volume of nut water was measured prior to copra-making. The copra weight was determined by kiln-drying and this was found to be in agreement with the copra weight determined from the husked nut basis (Peiris, 1934).

During the course of the observations, the status of Leaf Scorch Decline in few palms changed i. e., some palms originally described as moderate Leaf Scorch Decline turned advanced and some advanced Leaf Scorch Decline palms died. Such palms were not used in the experiment since the change.

RESULTS AND DISCUSSION

The observations were taken for 10 consecutive picks and the results are presented in Fig. 1 and Table 1. Fig. 1 shows the fluctuation of yield during the ten picks. The highest yield was recorded from healthy palms whereas the lowest yield was recorded from palms showing advanced Leaf Scorch Decline. In Table 1, the data have been subjected to Analysis of variance and Duncan's Multiple Range test (Duncan, 1955).

As seen from Table 1, the reduction in yield of palms showing moderate and advanced Leaf Scorch Decline is considerable. Similar differences are noticeable in fresh weight, weight of husked 'nuts' (withered and seasoned), copra weight and volume of 'nut' water. However, the differences in these parameters between healthy palms and those showing mild Leaf Scorch Decline were not significant ($p = 0.05$).

No significant difference ($p = 0.05$) has been observed in the length of the long axis of drupes harvested from healthy and Leaf Scorch-affected palms. However, the length of the short axis of drupes from healthy palms was found to be greater ($p \leq 0.05$) than that of drupes from palms showing advanced Leaf Scorch Decline. This is contrary to the observations of Ekanayake (1963) who stated that 'the nuts of affected palms are fewer, narrower and longer than those of unaffected palms'. In fact the drupes from affected palms have a much shorter short axis, as shown in the results, and this could possibly give an impression of elongation of drupes of affected palms. The descriptions of Ekanayake (1963) and Maramorosch (1964) are probably because of this visual effect.

The effect of Leaf Scorch Decline on the yield of coconut palms is clearly evident from the results presented. Copra produced by palms showing Advanced Leaf Scorch Decline is about 60% of that produced by healthy palms.

Considerable reduction of the length of the short axis results in the reduction of the volume of the drupe, and as a result, there would be corresponding reduction in drupe components such as kernel and water. Although a reduction in the quantity of copra has been recorded from palms affected with Leaf Scorch Decline, a previous experiment (Mahindapala, 1972) has shown that the quality of copra (assessed in terms of oil content) was similar in healthy and affected palms.

From the available data, a gradual decline of yield with the advancement of the Leaf Scorch Decline is noted. This is accompanied by reduction of 'nut' weight, copra and water content. On the whole, the drupe size, as evidenced by the reduction in length of the short axis, is reduced with the onset of Leaf Scorch Decline.

Yield and drupe characteristics of healthy palms and those showing mild Leaf Scorch Decline do not differ significantly. The palms were categorized mainly on foliar symptoms. A period of about 12 months elapses between 'nut' setting and maturity (Abeywardena & Fernando, 1963), and if the palm starts to show symptoms of Leaf Scorch Decline during this interim period, it appears that the 'nuts' are not affected. It is likely that the reduction of yield with the progress of Leaf Scorch Decline is due to the reduction in 'nut' setting. It is possible that during the initial stages of Leaf Scorch Decline, namely mild Leaf Scorch Decline, the reduction in yield is insignificant, and it can be concluded that symptoms on 'nuts' are visible at a later stage than the foliar symptoms.

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Table 1. *Yield and drupe characteristics of coconut palms affected with Leaf Scorch Decline**

	Condition of the palms**			
	healthy	Mild L. S. D.	Moderate L. S. D.	Advanced L. S. D.
Yield/annum/ 50 palms	2,436	2,103	1,531	552
Fresh weight Kg/ 'nut'	1.63	1.52	1.34	1.19
Weight of husked nut Kg/'nut'	0.69	0.65	0.53	0.42
Copra weight g/'nut'	211.6	200.9	167.3	130.2
Volume of 'nut' water ml/'nut'	147.3	132.6	94.0	56.0
Length of long axis cm	22.9	23.0	22.7	22.3
Length of short axis cm	16.2	15.9	15.2	14.6

* The data have been subjected to Analysis of Variance and Duncan's Multiple range test. Any two means (within one assessment) not underscored by the same line are significantly different (p 0. <05).

* L. S. D. refers to Leaf Scorch Decline.

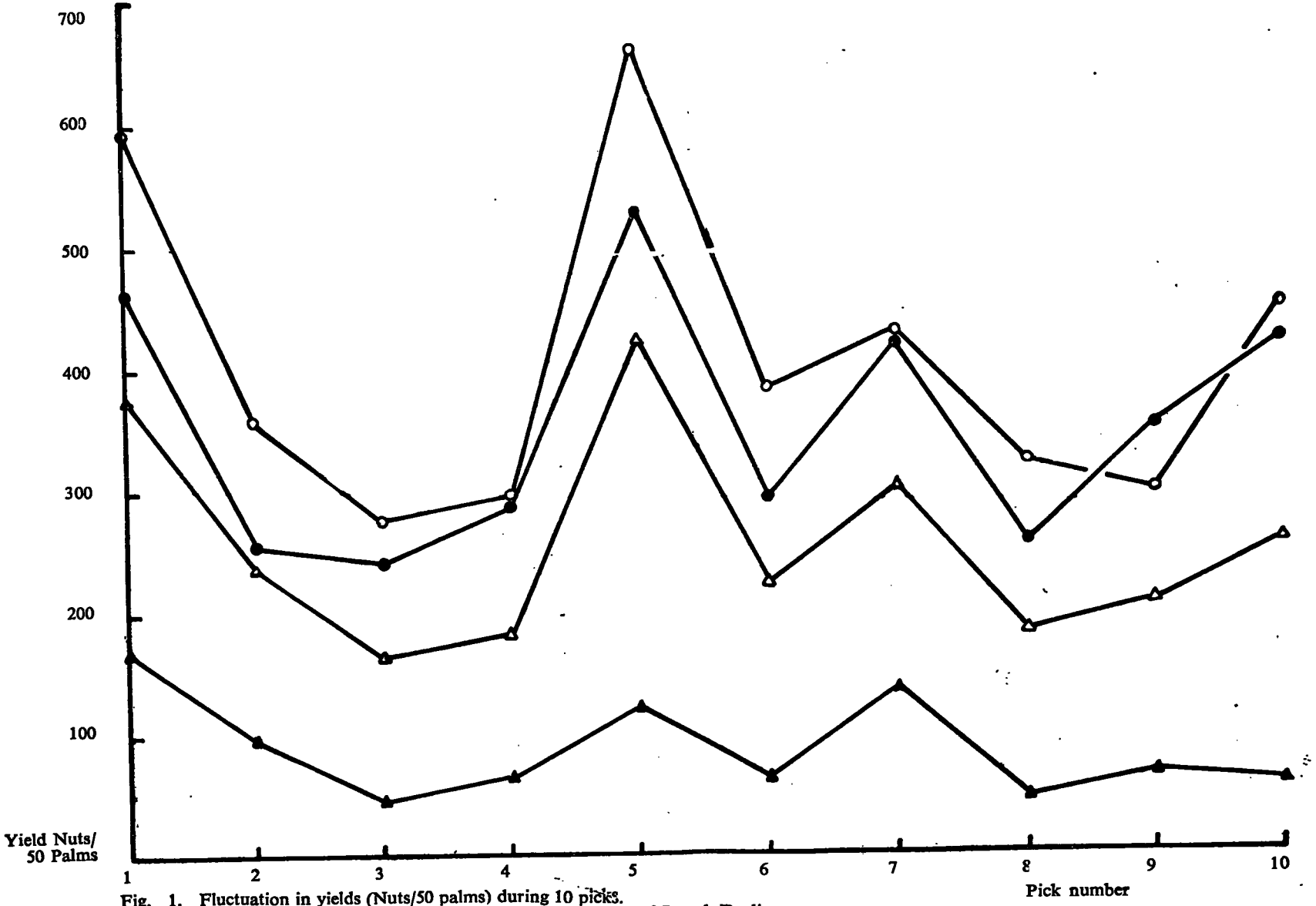

Fig. 1. Fluctuation in yields (Nuts/50 palms) during 10 picks.
(O) Healthy palms (●) mild Leaf Scorch Decline (Δ) moderate Leaf Scorch Decline.