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LACE BUG ABUNDANCE IN ROOT (WILT) DISEASE AFFECTED COCONUT PALMS - CAUSE OR EFFECT?*

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ABSTRACT

Correlation between the number of lace bug *Stephanitis typica* (Distant), on apparently healthy coconut palms in root (wilt) disease - prevalent tract and incidence of the disease on the same lot of palms in subsequent years brought out an ascending order of fresh incidence of root (wilt) with increase in abundance of the insect, thus implying an indirect role in transmission.

INTRODUCTION

Report by Mathen (1982) of the significantly higher colonisation of the lace bug *Stephanitis typica* (Distant) the suspected vector of coconut root (wilt) disease (Nagaraj and Menon, 1956; Shanta, Menon and Patchu Pillai, 1960, Shanta, Thomas Joseph and Lal, 1964) on infected palms did not specify whether the higher population led to the incidence of disease or the altered metabolism of the diseased palms attracted more insects to them. A correlation of the count of the lace bugs on palms one year before the expression of any visible symptom of the disease with disease incidence was relied upon to answer this question since earlier workers obtained positive results in transmission experiment, 8-11 months after the palms were inoculated with infective lace bugs.

MATERIALS AND METHODS

Out of a total of 779 young West Coast Tall coconut palms available at the farm of the Research Institute at Kayangulam under a nutritional experiment, 179 palms which had not seemingly contracted the disease till 1982 formed the material for study. Population of lace bugs on these apparently healthy (symptomless) palms was registered in March-April, corresponding to the peak period of abundance of the insect in the field (Mathen Mathew and Kurian, 1968) according to the technique evolved by Mathen, George and Kurian (1973). In 1983, palms exhibiting symptoms of coconut root (wilt) disease (Radha and Lal, 1972) were eliminated and the count of lace bugs was recorded on the remaining palms. Similarly in 1984, the diseased palms were identified. The incidence of disease in 1983 and 1984 was correlated with the insect abundance, respectively, in 1982 and 1983 for a meaningful interpretation in relation to vector abundance prior to the incubation

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period of the disease in the field, on its host plant.

RESULTS AND DISCUSSION

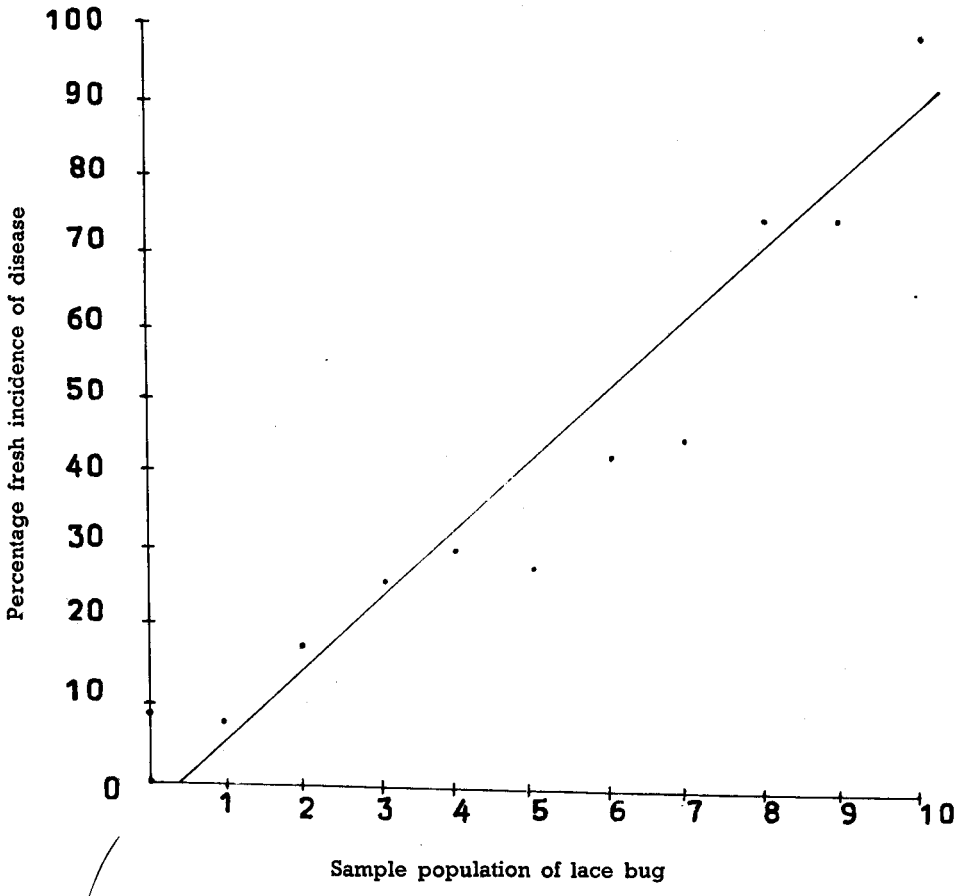
In the first year, 38 palms (21.2%) became diseased and in the second year, 32 (22.7%). Table I presents the distribution of the apparently healthy palms and those which had become diseased in groups with sample population varying from zero to ten or more, for 1982–1983, 1983–1984 and total for the two years. It is seen that fresh incidence of disease was in an ascending order in relation to the population of lace bug in the previous year in 1983 and 1984 separately and for both the years combined. Fig. 1 depicts a linear correlation. It also emerges from the result that for ensuring cent per cent successful experimental transmission, natural populations of lace bugs are to be employed in batches of 40 insects, which is the number derived by multiplying 10, the sample number yielding 100% fresh incidence, with the inflation factor given by Mathen et al (1973). This gains significance in the light of the report by Joseph, Shanta and Lal (1972) that only 16% of the field population of lace bug is infective and that although one insect could transmit the pathogen, vector efficiency was better with batches of ten insects. In 1984, the disease appeared in 10/53 palms (18.8%) with zero population at the time of observation in 1983. Five of them harboured 1–4 sample population in 1982; it is possible that infective lace bugs could gain access to all of them later. Similarly, none of the eight palms with a sample population of five developed the disease in 1984; it is probable that the lace bugs were not efficient transmitters in this case.

The data add to the available indirect evidences on the vector role of *S. typica* in coconut root (wilt) disease, cited by Shanta et al (1960) that the lace

Table I. *Distribution of apparently healthy coconut palms and those rendered diseased in groups with 0 to 10 or more of sample population of lace bugs*

Sample population	Number of fresh incidence of disease/Total number of palms (Figures in parenthesis indicate percentage)		
	1982–1983	1983–1984	Total
0	0/57 (. .)	10/53 (18.8)	10/110 (9.1)
1	0/8 (. .)	2/15 (13.3)	2/23 (8.7)
2	5/25 (20.0)	3/19 (15.8)	8/44 (18.2)
3	7/26 (26.9)	5/19 (26.3)	12/45 (26.7)
4	7/24 (29.1)	5/14 (35.7)	12/38 (31.6)
5	7/16 (43.8)	0/8 (. .)	7/24 (29.1)
6	4/9 (44.4)	3/7 (42.9)	7/16 (43.8)
7	3/8 (37.5)	2/3 (66.7)	5/11 (45.5)
8	3/4 (75.0)	0/0 (. .)	3/4 (75.0)
9	2/2 (100.0)	1/2 (50.0)	3/4 (75.0)
10/more	0/0 (. .)	1/1 (100.0)	1/1 (100.0)
	38/179 (21.2)	32/141 (22.7)	70/320 (21.9)

Fig. 1. Correlation of fresh incidence of coconut root (wilt) disease with lace bug abundance in the previous year



bugs formed the single major group of insect visitors on coconut and that palms which were highly infested by lace bugs became diseased earlier. Shanta, Mathen and Kurian, (1972) had further indicated a lower rate of spread of the disease on underplanted coconut seedlings sprayed fortnightly with 0.2% DDT to keep off the insects, than on the unsprayed ones. Epidemiology studies by Pillai, Sasikala and Mathew, (1980) were also suggestive of the involvement of aerial vector (s) in the spread of the disease. However, in the present day knowledge of coconut root (wilt) being an MLO-associated disease (Solomon, Govindankutty and Neinhaus 1983), the vector role of *S. typica* in root (wilt) needs further confirmation through electron microscopy, even-though lace bugs (Piesmidae) are reported vectors of two virus diseases and one RLO disease in sugar beet (Harris and Maramarosch, 1980). A probe into the feeding habits of lace bug has revealed that the stomatal insertion of the stylet

of *S. typica* is deep enough to reach the internal tissues including the phloem, which harbours MLOs (Mathen, Govindankutty and Mathew (1979).

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