PATTERN OF DISTRIBUTION OF *STEPHANITIS TYPICUS* DISTANT (HETEROPTERA : TINGIDAE), A PEST OF COCONUT PALM, ON ITS HOST PLANT

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Stephanitis typicus Distant invited detailed investigations from different angles because of its dual role as a carrier of the pathogenic principle involved in the root (wilt) disease of coconut in Kerala (Nagaraj and Menon, 1956; Shanta *et al.*, 1960) and as a pest of coconut (Anonymous, 1915; Mathen, 1960). Hence studies on the tingid pest were intensified at the Central Coconut Research Station, Kayangulam. The patterns of distribution of the pest on the host plant, which are useful for estimating the population of the pest in the field, are reported in this paper.

MATERIAL AND METHODS

During a study (1960–62) on the fluctuation in population of the pest in the field, the total number of adults and nymphs present on each of the 80 seedlings selected at random from 316 experimental seedlings out of a total of 412 five-year-old seedlings in an area of 3·5 ha was recorded by 'direct counting' (Southwood, 1966). Details were worked out on the total number of leaves per seedling, number of infested leaves, position of the infested leaf as counted from outside toward the spindle, total number of leaflets per attacked leaf, number of attacked leaflets, their position on the leaf as counted from the base toward the tip, and the number of adults and nymphs lodged by each infested leaflet. A seedling was considered infested if at least one pest was present at the time of observation on any leaflet. Observations were recorded at monthly intervals for 2 years.

The number of leaves per seedling and the number of leaflets per leaf varied considerably. Hence the position of leaves and leaflets attacked were standardized by allotting scores varying from 1 to 100 obtained by calculating as follows:

$$\frac{\text{Position of attacked leaf} \times 100}{\text{Total number of leaves for the seedling}}$$

for each attack of leaf; and

$$\frac{\text{Position of attacked leaflet} \times 100}{\text{Total number of leaflets for the leaf}}$$

for each attack of leaflet.

A frequency table was formed by grouping these scores into 10 classes of 10 units each. The density of attack was calculated by adding up the frequency of attack of leaf and leaflet under each score group. The density of population was also similarly estimated separately for leaves and leaflets by totalling the actual number of pests observed—adults, nymphs and their total—under each score group to ascertain whether it was related to the frequency of attack.

RESULTS AND DISCUSSION

The leaves that were infested most frequently were those with scores 91–100, infestation being progressively lower on leaves with less scores, whereas leaflets with scores 41–60 were more prone to attack than others (Table 1, Figs 1, 2). The frequency of attack on leaves in the score group 71–100 was 83·74 per cent and in the score group 51–100 it was 95·80 per cent. In the case of leaflets, the distribution is more spread out, 88·20 per cent occurring in the leaflets with score 21–80. The density of population has also a direct bearing on the frequency of infestation, 92·29 per cent population occurring on leaves in the last 4 score groups with 91·6 per cent frequency of infestation. Similarly, in the case of leaflets also, 86·81 per cent of the pests were lodged on leaflets in the score group 21–80 having a density of attack

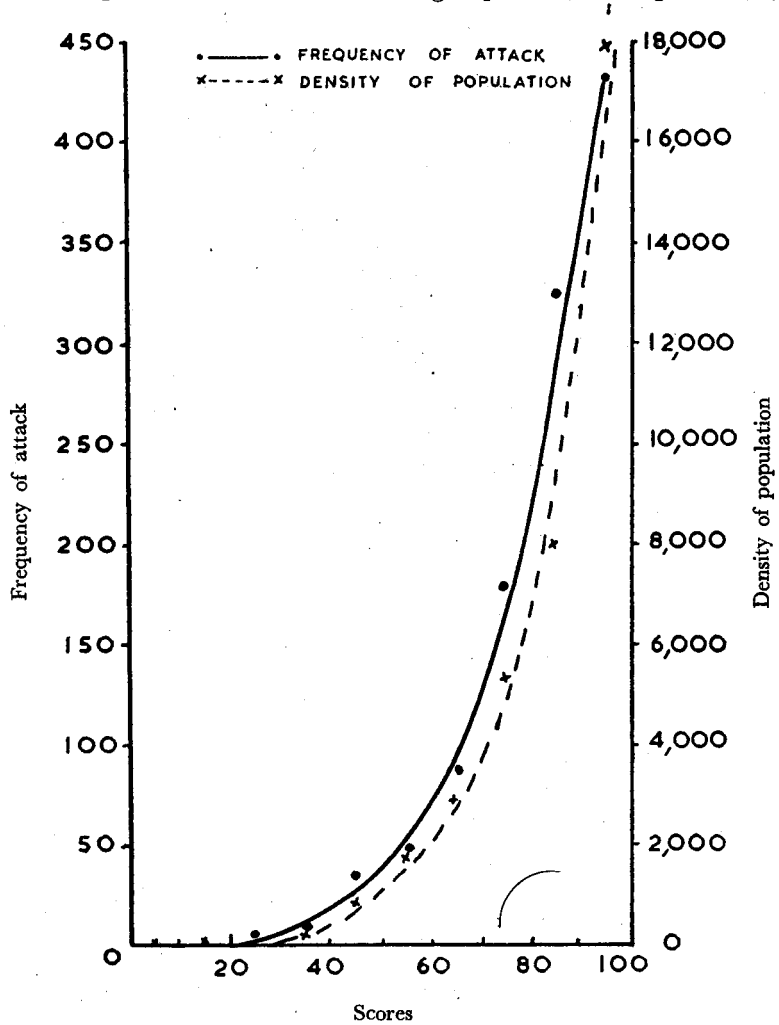

Fig. 1. Frequency of attack and Density of population of *Stephanitis typicus* Distant on coconut leaves.

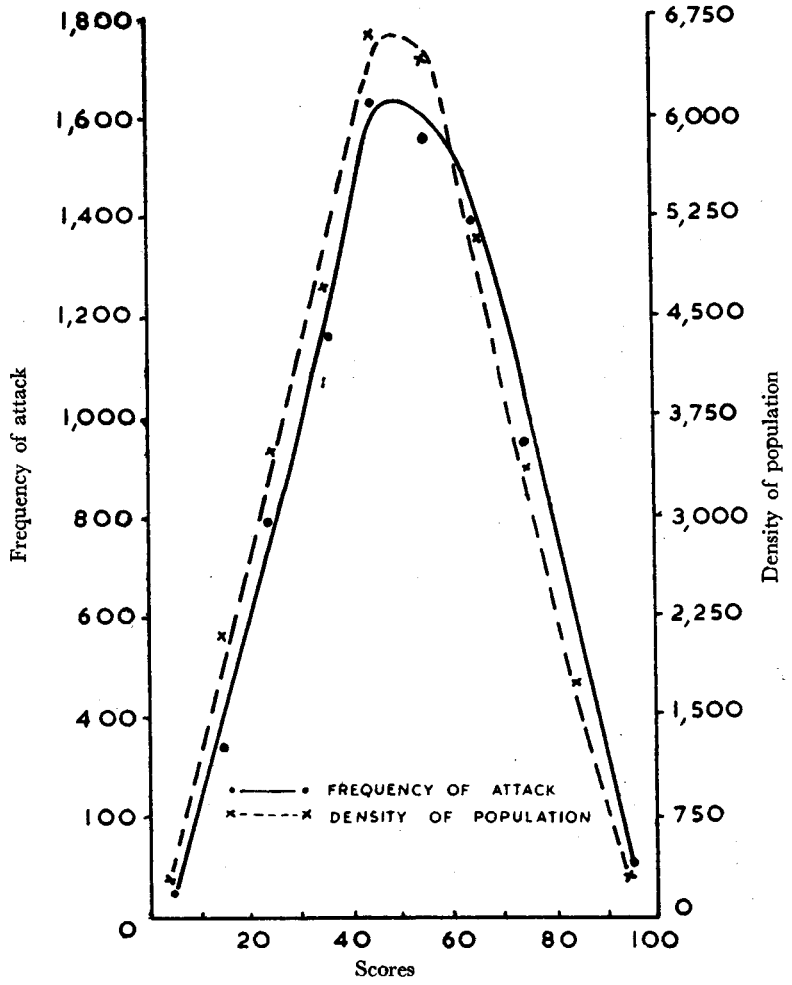

Fig 2. Frequency of attack and Density of population of *Stephanitis typicus* Distant on coconut leaflets.

of 88·2 per cent. Thus in a seedling with 15 leaves and a leaf with 240 leaflets (120 on either side of the petiole), the frequency of attack and the density of population will be as shown in Table 1.

The information available from the present study is being profitably employed in the evolution of a sampling technique to estimate the population of the pest on infested seedlings. Precise estimation of population becomes essential in studies on the count of the pest before and after insecticidal treatment for controlling the pest in the field and for comparing the abundance of the pest on diseased and healthy palms. Takeda and Hukusima (1961) studied the spatial distribution of the pear lace-bug *Stephanitis nashi* Esaki & Takeya on apple and reported that the bugs were not usually distributed on a definite part of the tree, but were scattered on all parts with about the same amount of individuals. In coconut the differences in the nature of the host plant is the main

TABLE I. FREQUENCY OF ATTACK AND DENSITY OF POPULATION OF *STEPHANITIS TYPICUS* DISTANT ON COCONUT LEAVES AND LEAFLETS

Score group	1–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	91–100
					Leaves					
Position of leaf	1,	2,3,	4,	5,6,	7,	8,9,	10,	11,12,	13,	14,15
Density of attack (%)	Nil	0·09	0·18	0·80	3·13	4·20	7·86	16·09	29·04	38·61
									67·65	
								83·74		
							91·60			
						95·80				
Density of population (%)										
Adults	Nil	0·06	0·05	0·45	3·21	6·31	9·38	15·54	21·71	43·29
Nymphs	Nil	0·01	Nil	0·71	1·68	3·74	6·67	13·66	21·59	51·94
Total	Nil	0·03	0·02	0·61	2·29	4·76	7·75	14·41	21·64	48·49
									70·13	
								84·54		
							92·29			
						97·05				
					Leaflets					
Position of leaflet	1–12	13–24	25–36	37–48	49–60	61–72	73–84	85–96	97–108	109–120
Density of attack (%)	0·69	4·08	9·32	13·75	19·16	18·34	16·42	11·21	5·65	1·38
					37·50					
					67·67					
					88·20					
Density of population (%)										
Adults	0·92	5·13	10·67	14·65	19·64	17·71	15·17	10·38	4·74	0·99
Nymphs	0·86	6·95	9·93	13·36	19·00	19·45	14·61	9·50	5·46	0·88
Total	0·88	6·22	10·23	13·89	19·25	18·75	14·84	9·85	5·17	0·92
					38·00					
					66·73					
					86·81					

factor governing a definite pattern. As the outer leaves become older, the adults emerging from a previous generation abandon the leaf in search of better posture, toward the inner tender leaves. For fresh infestation, the flying or the wind-carried

insect has quicker, easier and ready access to the middle and inner leaves which stand out with their lower surfaces exposed. (The bugs are seen only on the lower surface.) The leaves of the whorls below the middle are so disposed on the crown of the palm that they are either parallel to the ground or at acute angles with the stem so that the lower surfaces of the leaflets are concealed. The greater concentration of the pest in the middle of the leaf is probably caused by (*i*) greater disturbances through movements of leaflets at both the base and apex of the leaf, or (*ii*) the larger area of the broader, longer middle leaflets, which afford more protection to the fragile lace-bugs.

SUMMARY

The data on the total number of *Stephanitis typicus* Distant lodged on 80 coconut seedlings on the different leaves and leaflets show that the pest was present in increasing numbers from the outer to the inner leaves and that it was more concentrated on the middle leaflets than on either end of each leaf.

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