A TECHNIQUE TO ESTIMATE FIELD POPULATIONS OF COCONUT LEAF EATING CATERPILLAR[1]

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ABSTRACT

A study was carried out at Kayangulam during 1967–70 with a view to evolving a sampling technique for estimating the population of *Opisina arenosella* Walker one of the serious pests of the coconut palm in India. Leaflet-wise and leaf-wise counts of the pest were recorded from 50 young palms, for 36 months. The middle leaves and leaflets were found to lodge more number of caterpillars than the other parts of the palm (with minimum C. V.%). Linear regression equations were fitted for estimating the total pest population of a palm by counting the pests in the middle 41–60 per cent of leaflets of the first 20 per cent of leaves from the bottom.

INTRODUCTION

Coconut leaf eating caterpillar, (*Opisina arenosella* Walker syn. *Nephantis serinopa* Meyrick, Lepidoptera) is a major pest of the coconut palm occurring in the coastal and back-water belts of the country. Sathiamma *et al.*, (1974) observed that the pest population was maximum during April-June, medium during February-March and September-October, and low in November-January. Assessment of the pest population and adoption of suitable and timely control measures are indispensable to contain the sporadic outbreaks of the pest. A sampling technique was, therefore, attempted to estimate the total pest count in a palm, the results of which are presented in this paper.

MATERIAL AND METHODS

The absolute population of the pest was recorded in 1967–70 by the direct counting method on 50 young palms planted on

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the bunds in single rows in the lake area of Kayangulam, Alleppey district, Kerala State. The total number of leaves, infested leaves, number of leaflets, infested leaflets, and larval population on each leaflet, were recorded at monthly intervals for 36 months from June 1967 to May 1970.

As great variation existed in the number of leaves per palm and the number of leaflets per leaf, the determination of sample size of leaves and leaflets in a palm became rather difficult as experienced in *Stephanitis* estimations by Mathen *et al.*, (1973). Hence, a scoring procedure was adopted. The groups of leaflets were divided into five zones in a leaf from the base. First score group comprised twenty per cent of the leaflets from the base on either side, second score group being the next twenty per cent of the leaflets, and so on. Similarly, the leaves were also divided into five score groups from the bottom, first score group of leaves comprising twenty per cent of the leaves from the bottom, second score group being the next twenty per cent, and so on. Pest population in each score group of leaflets and leaves was calculated and its correlation with the total pest population in the palm worked out for individual months, and then computed for the different seasons. Depending upon the trends in population density of the pest, July-October and February-March periods had medium, April-June high, and November-January, low levels of population. These periods were, therefore, treated as separate groups.

Results and Discussion

Seasonwise data on the larval population which was present in each score group of leaves and leaflets (Table–1) showed that the middle leaves and leaflets harboured the maximum number of pests (C.V.% being the minimum). Simple correlations of the counts of pests in the five score groups of leaves to the total counts of pests in the entire palm worked out for each month separately, revealed that the correlations were higher in the third score group followed by the fourth, second, and first. When the correlation coefficients were worked out season-wise (Table 2), except for February-March 1970, all were highly significant for the first score group. The counting of pest population other than that from the

Table 1. Percentage distribution of *Opisina arenosella* caterpillars in the different score groups of leaves and leaflets (seasonwise)

Period	Leaves (%)					Leaflets (%)				
	1–20	21–40	41–60	61–80	81–100	1–20	21–40	41–60	61–80	81–100
July–Oct.:										
Mean	17.1	29.4	32.9	16.0	4.5	3.2	18.2	35.3	34.2	9.1
C.V. (%)	51.6	45.9	38.0	52.4	149.3	143.7	77.2	46.1	47.0	106.0
Nov–Jan.:										
Mean	15.5	28.3	35.6	16.5	4.0	2.3	13.6	41.2	32.7	10.1
C.V. (%)	86.8	56.2	45.7	98.8	194.3	249.7	109.0	52.5	62.8	161.0
Feb–Mar.:										
Mean	12.2	30.8	33.4	17.7	5.9	1.8	16.8	41.9	33.2	6.2
C.V. (%)	84.0	55.0	42.7	79.6	119.5	222.9	105.8	54.3	69.2	159.1
Apr.–June:										
Mean	11.8	30.6	32.2	19.1	6.4	3.3	20.4	40.4	27.3	8.6
V.V. (%)	74.4	50.2	41.7	61.9	112.1	373.2	92.1	52.2	59.7	114.1

Table 2. Correlation of larval population of *Opisina arenosella* in different score groups of leaves with the total population of pest in the palm (Y), season-wise

Year	Period	$r_{1,Y}$	$r_{2,Y}$	$r_{3,Y}$	$r_{4,Y}$	$r_{5,Y}$
1967	Jul—Oct	0.61**	0.82**	0.81**	0.79**	0.32*
1967—68	Nov—Jan	0.62**	.077**	0.77**	0.63**	0.37*
1968	Feb—Mar	0.45**	0.60**	0.83**	0.61**	0.60**
	Apr—Jun	0.79**	0.87**	0.75**	0.68**	0.43**
	Jul—Oct	0.40**	0.70**	0.78**	0.79**	0.47**
1968—69	Nov—Jan	0.50**	0.42**	0.56**	0.84**	0.36*
1969	Feb—Mar	0.55**	0.77**	0.90**	0.65**	0.25
	Apr—Jun	0.69**	0.89**	0.88**	0.59**	0.38**
	Jul—Oct	0.77**	0.79**	0.71**	0.65**	0.19
1969—70	Nov—Jan	0.84**	0.86**	0.90**	0.44**	0.26
1970	Feb—Mar	0.23	0.63**	0.85**	0.62**	0.52**
	Apr—May	0.51**	0.77**	0.77**	0.79**	0.57**

* Significant at 5% level; ** Significant at 1% level.

Table 3. Correlation of larval population of *Opisina arenosella* in different score group of leaflets in 1–20% of leaves, to the total pests in the palm (pooled season-wise over the years)

		Leaflet score groups (%)					Number of palms infested
		1–20	21–40	41–60	61–80	81–100	
Feb—Mar	(1968–70)	0.68**	0.52**	0.45**	0.39*	0.04	43
Apr—Jun	(1968–70)	0.63**	0.68**	0.77**	0.52**	0.51**	47
Jul—Oct	(1967–69)	0.36*	0.61**	0.65**	0.46**	0.33*	50
Nov—Jan	(1967–70)	0.21	0.49**	0.58**	0.44**	0.39**	39

* Significant at 5% level; ** Signficant at 1% level.

first score group is cumbersome and destructive. Hence, further analysis was done taking the first group of leaves only.

Table 3 gives the correlation coefficients between the number of caterpillars in different score groups of leaflets in the 1–20 per cent of leaves and the total counts of caterpillars for the entire palm pooled over three years. Highly significant correlations were obtained in the case of second (21–40%), and third (41–60%) score groups of leaflets to the total count of pest in the whole palm, and in most cases maximum correlations were obtained for the middle score group. During February-March, higher correla-

Table 4. Linear regression coefficients and intercepts for estimating the total counts of *Opisina arenosella* per palm in different seasons from the first three score groups of leaflets of 1–20% of leaves

	Leaflets %	a	b	S.E. (b)	r^2	Number of palms infested
Feb–Mar (1968–70)	1–20	22.00	144.48**	24.32	0.46**	43
	20–40	25.89	8.75**	2.27	0.27**	
	40–60	22.59	5.75**	1.80	0.20**	
Apr–Jun (1967–70)	1–20	61.32	41.86**	7.63	0.40**	47
	20–40	46.81	14.74**	2.35	0.47**	
	40–60	38.40	9.70**	1.19	0.59**	
Jul–Oct (1967–69)	1–20	28.91	37.78*	14.14	0.13*	50
	20–40	21.98	13.31**	2.51	0.37**	
	40–60	20–57	6.20**	1.05	0.42**	
Nov–Jan (1967–70)	1–20	14.04	8.22	12.27	0.01	39
	20–40	10.56	11.46**	3.39	0.24**	
	40–60	6.36	8.99**	2.10	0.33**	

*Significant at 5% level; **Significant at 1% level

tion (0.68) was observed between the number of caterpillars in the first score group of leaflets than in the second or third score groups of leaflets, with the total number of caterpillars in the palm. Table 4 gives the linear regression coefficients and intercepts for estimating the total pests present in the palm from the first three score groups of leaflets together with the SE's. The regression coefficients were found to be heterogeneous between seasons and hence a general formulae is not suggested. As the pest intensity and spread varied much between seasons it will be advantageous to use different formulae for estimating the pest population accurately. All the regression coefficients and the coefficients of determination were highly significant for all the seasons for the first score group except for November-January (1967–70), when the population was very meagre.

As the pest outbreak is sporadic in different localities, immediate assessment of the pest population has to be made for resorting to control measures. The above formulae would help in the quick assessment of the pest population and timely adoption of effective control measures. It is cumbersome to count the total pest population in a palm without cutting down the leaves/leaflets from grown-up palms. Sampling can, therefore, be restricted to the middle portion of the lower leaves (1–20% score group of the leaves).

ACKNOWLEDGEMENT

The authors are grateful to Dr. K. V. Ahamed Bavappa, Director, CPCRI, Kasaragod, for the facilities provided, and to Dr. K. Radha, Scientist-in-charge, CPCRI Field Station, Trichur, Dr. Chandy Kurian, Sr. Scientist (Entomology), and Mr. G. B. Pillai, Scientist S2 (Entomology) at CPCRI (RS), Kayangulam, for their guidance and help in this work.

REFERENCES

MATHEN, K., GEORGE, M. V. and CHANDY KURIAN (1973). A technique to estimate the field population of the lace-bug, *Stephanitis typicus* Distant (Heteroptera: Tingidae), a pest of coconut palm in Kerala. *Indian J. agric. Sci.*, 43: 106-109.

SATHIAMMA B., GEORGE, M. V. and CHANDY KURIAN (1974). Seasonal variation in the larval population of *Nephantis serinopa* Meyrick in the field, as correlated with meteorological factors. *Proc. Ist Natl. Symp. Plant. Crops., Trivandrum, 1972; J. Plant. Crops*, 1(Suppl.): 161-163.