

**Effects of Feeding Sites on Fecundity and Longevity of the Palm aphid, *Cerataphis palmae* Ghesquiere (Homoptera:Pemphigidae) on Young Dwarf Coconuts**

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**ABSTRACT**

The influence of feeding site preferences on the fecundity and longevity of the palm aphid, *Cerataphis palmae* Ghesquiere on three dwarf coconut varieties: Malayan dwarf red (Mdr); Malayan dwarf green (Mdg); and Malayan dwarf yellow (Mdy) was studied in a screenhouse using leaf clip on cages. Using Mdr, the fecundity of *C. palmae* was significantly highest on young basal leaflets followed by mature basal leaflets and young frond terminal leaflets. With the Mdg, mean number of nymphs produced on young basal leaflets and young frond terminal leaflets was significantly higher than on mature basal leaflets. Similarly, there was no significant difference in fecundity on young basal leaflets and frond terminal leaflets of Mdy variety. Fecundity on mature basal leaflets was however, lower than on both young basal and frond terminal leaflets. On the three varieties, longevity on young basal and frond terminal leaflets were significantly higher than on mature basal leaflets.

**INTRODUCTION**

Aphids are among the most important plant pests the world over. They feed generally on the phloem sap of plants. The palm aphid, *Cerataphis palmae* Ghesquiere is one of the pests that infest dwarf coconuts. Preliminary investigations (Vanialingam *et. al.*, 1980) have shown that the aphid has varied feeding site preferences on three common dwarf coconut varieties in Nigeria: Malayan dwarf red (Mdr); Malayan dwarf green (Mdg); and Malayan dwarf yellow (Mdy). *C. palmae* is found distributed on the central spear leaf and on young and mature basal leaflets of frond-one, as well as on young frond terminal leaflets.

Wyatt (1965) observed that different varieties of crop plants not only support populations of different sizes, but also the populations may be distributed differently. Consequently, the abundance of *C. palmae* on dwarf coconuts could be made only by considering the overall effect of the different feeding sites on fecundity and longevity.

This study, therefore, determined the influence of the different feeding sites of *C. palmae* on its fecundity and longevity on three dwarf coconut varieties. This will invariably give an insight into the relative contribution of the different feeding sites to the overall abundance of the aphid on each variety.

### MATERIALS AND METHODS

Three dwarf coconut varieties of the same age i.e. 15 months were infested with adult aphids from the stock culture reared on raphia palm. The experiment was conducted in a screenhouse at an average atmospheric temperature of  $30 \pm 1.13^\circ\text{C}$  and relative humidity of 70-1.63%. The three varieties used were Malayan dwarf red (Mdr), Malayan dwarf green (Mdg) and Malayan dwarf yellow (Mdy).

The fecundity and longevity of *C. palmae* on young dwarf coconuts were studied using leaf-clip-on cages. At first, a young adult of *C. palmae* was caged on the abaxial surface of a young basal leaflet of the first frond of each coconut variety. Each was replicated ten times. This was repeated on the abaxial surfaces of mature basal leaflets and young frond terminal leaflets of the three varieties. The time the nymph in each cage became adult and when each produced the first nymph were recorded. The number of nymphs produced by each aphid caged singly was recorded daily. The aphids remained in the cages until death. The date the aphid died in each cage was also noted. The two factors, site and variety, were considered at three levels each and statistical analysis was carried out as a 3x3 factorial in a completely randomized design (CRD) in ten replications.

### RESULTS

Tables 1 and 2 represent the overall results of the fecundity and longevity of *C. palmae* on the three dwarf coconut varieties. From the analysis of variance, the fecundity and longevity were significantly different ( $P < 0.01$ ) among the three dwarf coconuts. The sites at which the aphid reproduced also varied significantly ( $P < 0.05$ ). There was significant difference in longevity ( $P < 0.01$ ) at the different sites.

Table 1 shows the fecundity of *C. palmae* on the dwarf coconuts. The mean number of nymphs produced by *C. palmae* on young basal leaflets of Malayan dwarf red coconut was  $23.4 \pm 1.03$  while  $16.4 \pm 3.4$  and  $8.2 \pm 1.36$  were recorded on mature basal leaflets and young frond terminal leaflets respectively. Duncan's Multiple Range test showed that these figures on Mdr were significantly different ( $P < 0.05$ ). With the Malayan dwarf green (Mdg) variety, mean number of nymphs produced on young basal leaflets was  $9.8 \pm 1.83$ . Numbers obtained on mature basal leaflets and frond terminal leaflets were  $6.3 \pm 0.86$  and  $9.6 \pm 1.03$  respectively. Fecundity on young basal leaflets and frond terminal leaflets were not significantly different ( $P > 0.05$ ). The number of nymphs produced on young basal, young mature and frond terminal leaflets on the Malayan dwarf yellow (Mdy) were  $14.4 \pm 2.84$ ,  $11.4 \pm 2.58$  and  $16.8 \pm 2.35$

**Table 1: Mean number of nymphs produced (fecundity) by *C. palmae* on young, mature and frond terminal leaflets of dwarf red, green and yellow coconuts**

Variety	Young basal leaflet ±S.E.	Mature basal leaflet ±S.E.	Frond terminal leaflet ± S.E.
Malayan dwarf red (Mdr)	23.4±1.03 <sup>a</sup>	16.4±3.47 <sup>b</sup>	8.2±1.36 <sup>c</sup>
Malayan dwarf green (Mdg)	9.8±1.8 <sup>c</sup>	6.8±0.86 <sup>d</sup>	9.6±1.03 <sup>c</sup>
Malayan dwarf yellow	14.4±2.84 <sup>b</sup>	11.4±2.58 <sup>c</sup>	16.8±2.35 <sup>b</sup>
Mean for the three sites :Mdr (16.0±2.04), Mdg (8.7±0.79), Mdy (14.3±1.51)			

Means followed by the same letter in row and column are not significantly different at 5% probability.

**Table 2: Mean longevity (days) for *C. palmae* on young, mature and frond terminal leaflets of dwarf red, green and yellow coconuts.**

Variety	Young basal leaflet ±S.E.	Mature basal leaflet ±S.E.	Frond terminal leaflet ± S.E.
Malayan dwarf red (Mdr)	48.8±1.46 <sup>a</sup>	41.8±1.56 <sup>b</sup>	42.6±1.96 <sup>b</sup>
Malayan dwarf green (Mdg)	36.0±1.14 <sup>c</sup>	32.8±0.80 <sup>d</sup>	33.2±1.24 <sup>d</sup>
Malayan dwarf yellow	40.8±2.06 <sup>b</sup>	37.0±1.52 <sup>c</sup>	38.6±2.04 <sup>c</sup>
Mean for the three sites :Mdr (16.0±2.04), Mdg (8.7±0.79), Mdy (14.3±1.51)			

Means followed by the same letter in row and column are not significantly different at 5% probability.

Table 1 shows fecundity on young basal and frond terminal leaflets did not vary significantly ( $P < 0.05$ ). Table 2 shows longevity at the various sites. Longevity on young basal and frond terminal leaflets of Mdr were  $48.8 \pm 1.64$ ,  $41.8 \pm 1.56$ , and  $42.6 \pm 1.96$  respectively. On Mdg, longevity recorded on young basal, mature basal and frond terminal leaflets were  $36.0 \pm 1.4$ ,  $32.8 \pm 0.8$  and  $33.2 \pm 1.24$  respectively. At all the sites, longevity were  $40.8 \pm 2.06$ ,  $37.0 \pm 1.5$ , and  $38.6 \pm 2.04$  respectively. Longevity was generally higher on young basal leaflets than on both the mature basal and frond terminal leaflets for the three varieties.

The mean daily reproductive rate of the aphid was highest within the first 14 for the three coconut varieties. The rate declined with almost the same proportion it terminated on the 32nd day of Mdg, 35th for Mdy and 49th for Mdr. Specific the mean rate for Mdr (0.55) was highest compared with those of Mdy (0.45) and (0.33).

### DISCUSSION

Naturally, aphids are not uniformly distributed on most plants where they occur. Kennedy and Booth (1951) reported that aphids prefer to feed and reproduce better on young than on mature leaves. Results of the present study have shown that fecundity of *C. palmae* was generally higher on young basal leaflets and young frond terminal leaflets than on mature basal leaflets. This indicates that *C. palmae* would prefer to feed and reproduce better on young than on mature leaflets where there is more favourable nutrient from the phloem sap. Blackman (1974) reported that in places where aphids choose to feed on the plant are rich in nitrogenous materials in the sap. Further observations showed that on the Mdg variety, mean number of nymphs produced on mature basal leaflets was significantly higher than the number produced on young frond terminal leaflets suggesting that the carrying capacity of the aphid on mature basal leaflets of Mdg would be higher than that on young frond terminal leaflet. Ibbotson and Kennedy (1951) suggested that unequal distribution of aphids among leaves primarily reflected intrinsic differences between leaves. This could be aided by gregariousness which increases with time and lingers as the palm develops.

The different feeding sites also affected longevity differently on dwarf coconut. The mean adult life of the aphid was significantly longest on young basal leaflets. The mean longevity of 37 days on dwarf yellow to about 49 days on dwarf red are quite in contrast with the 31.9 days recorded by Enobakhare (1985) for this aphid on young *Raphia hookeri*.

Total progeny per adult aphid produced on Mdr, Mdg and Mdy varieties was 16, 8.7 and 14.2 respectively. While there was significant difference between fecundity on young basal, mature basal and frond terminal leaflets of Mdr and Mdy, significant difference did not exist between the overall fecundity on both varieties. This trend highlights the importance of considering the sum-total effect of different feeding sites of the aphid before making conclusions on the relative abundance on each coconut variety. Rates of reproduction showed that larviposition did not also take place daily. Although the rates were generally low, the overlapping of reproductive phases would likely influence increases in aphid population.

Overall, it is noted that different feeding sites of *C. palmae* on young dwarf coconut varieties have significant influence on the fecundity and longevity and ultimately on the relative abundance of the aphid on the entire crop. Expectedly, young leaflets are likely to have higher carrying capacity than the mature ones. The adult

Aphids are also likely to live longer on young leaflets than on mature ones. This picture may not be so as the palm grows older. Total progeny produced and longevity on each variety may give an indication that the Malayan dwarf red would be most susceptible while the Malayan dwarf green would be least susceptible to *C. palmae* infestations in young palms.

## REFERENCES

- BLACKMAN, R.L. 1974. Invertebrate Type Aphids. Guinn and Company Ltd., London, 175pp.
- ENOBAXHARE, D.A. 1985. Studies on the biology of the palm aphid, *Cerataphis variabilis* (Homoptera:Pemphigidae), on *Raphia hookeri* - 1. *Insect Science and its Application*. 6 (2): 177-181.
- EBOTSON, A. and KENNEDY, J.S. 1951. Aggregation in *Aphis fabae* Scop. 1. Aggregation on plants. *Annals of Applied Biology*, 28: 65-78.
- KENNEDY, J.S. and BOOTH, C.O. 1951. Host alternation in *Aphis fabae* Scop. 1. Feeding performances and fecundity in relation to the age and kind of leaves. *Annals of Applied Biology*. 38: 25-64.
- ANIALINGAM, T., KHOO, K.T. and CHEW, P.S. 1980. Performance of Malayan dwarf x Tall Coconut hybrids in Peninsula Malaysia. Proceedings of International Conference on cocoa and coconuts in Kuala Lumpur 1SP 1980, 532-542.
- MATT, I.J. 1965. The distribution of *Myzus persicae* Sulz. on year-round chrysanthemum 1. Summer Season. *Annals of Applied Biology* 56: 439-459.