COCOS (2005), 17 53 - 56
*Printed in Sri Lanka*

# A RAPID METHOD FOR POPULATION ASSESSMENT OF THE COCONUT ERIOPHYID MITE, *ACERIA GUERRERONIS* KEIFER (ERIOPHYIDAE: ACARI)

**K. Ramaraju**

*Department of Agricultural Entomology*
*Tamil Nadu Agricultural University*
*Coimbatore – 641 003, India*

## ABSTRACT

A simple, reliable and effective Water Wash Count Method to estimate the population of the coconut eriophyid mite, *Aceria guerreronis* on coconut buttons, is reported.

## INTRODUCTION

Outbreaks of the coconut eriophyid mite, *Aceria guerreronis* Keifer, hitherto a serious pest of coconut in other parts of the world, were reported from Kerala and Tamil Nadu during 1998 by Sathiamma *et al.*, (1998) and Ramaraju *et al.*, (1999). Since then it has spread to almost all parts of Tamil Nadu and the level of infestation varies from 10 to 90 %. The attack results in both qualitative and quantitative losses in yield. The eriophyid mites are minute, about 250 $\mu$ long and 50 $\mu$ in width, and multiply rapidly. The mites feed on the meristematic tissue found under the perianth of growing nuts and also adhere to the inner surface of sepals. The mite infestation on nuts is patchy; not uniformly distributed.

Two types of sampling methods, non destructive and destructive, are widely used by many workers. In non-destructive sampling, mites are counted *in situ* allowing subsequent counts at the same site. However, non-destructive sampling methods cannot be employed in the case of gall forming eriophyid mites, since numerical estimates of individuals typically depend on removing the mite from the galls (Perring *et al*, 1996). The major disadvantage of non-destructive sampling is that sampling requires more time in the field and is very difficult to observe mites in concealed niches. Hence, destructive sampling methods that save time are used to assess mite populations. Of the several methods adopted for estimating mite populations by destructive methods, Yothers and Millers (1934) used a counting template, consisting of a 0.5 inch square, cut in a piece of paper, to estimate the densities of citrus rust mites on the upper and lower surfaces of leaves and on fruits. Ramaraju *et al.*, (2000 and 2001) estimated mortality of *A. guerreronis* either by counting only the live mite population or by counting dead and live mite populations found in a unit area of 4 sq.mm.

There is a need to measure the abundance of eriophyid mites without removing nuts from the tree. But since the coconut eriophyid mites, *A. guerreronis* are found concealed beneath the tepals, it has not been possible to accurately estimate the mite population on coconut by non-destructive sampling methods. There is no uniformity in the infestation and no damage on the surface area. Even in the same plantation some trees may be free of infestation, and in a bunch few nuts may be completely free of damage. Hence, selecting and sampling nuts having different infestation levels is very difficult. Although not very precise, destructive sampling is the most widely used method of assessing eriophyid mite populations.

It is very cumbersome to count mites present in a unit area, under a microscope and may possibly lead to biased sampling. Hence, a reliable and an effective method using water was developed to estimate the total mite population in coconut buttons.

## MATERIALS AND METHODS

### Assessing mite populations

***Water wash count method*** - The materials required for this method consisted of a 50 ml beaker, funnel, nematode counting dish, wooden stand, scalpel, 1 ml syringe and water. A few drops of soap solution or detergent were added into the water to facilitate washing. Infested samples (four-month old buttons) were collected from the field and the 'tepals' were first removed separately with the help of a knife or scalpel. Place the funnel in the wooden stand and beaker under the funnel. Wash the inner surface of all the six tepals by forcibly ejecting the soap water solution using the 1 ml syringe and collect the different bio stages in the beaker through funnel. Then hold the nut upside down and wash the meristematic tissue (i.e. area covered by the tepals). Repeated washing (4-5 times) is necessary to collect all the bio stages. Approximately 10 ml of soap solution is required to completely wash the tepals and nut surface. If necessary, add a few ml and make up the solution to either 10 or 20 ml per sample. Shake thoroughly and take a one or two ml aliquot from the beaker, count the bio stages either separately or larvae + adult mites per ml using the nematode count dish under a stereo-zoom microscope and calculate the numbers in the total volume of water used. Other organisms like the predatory mites, mealy bug crawlers, predatory thrips etc. found within the tepals may also be washed out. If required these may be counted separately.

***Template count method*** – In this method the live eriophyid mite population, both nymphs and adults, was recorded in a 4 sq. mm area, using a template, on each of the innermost bracts (three observations on 4 $^{th}$, 5 $^{th}$ and 6$^{th}$ bracts) and the nut surface (at three places), in each sample. The

observations were made at the places which appeared to have the largest populations.

An experiment was conducted to compare the two methods described above. Twenty trees were maintained separately, for each treatment. A single, infested, four-month old button was collected each month from each tree for population assessment, from January 2000 to December 2001. Thus, a total of 480 coconut buttons were assessed, in each treatment. The data were statistically analysed using correlation and regression methodology.

## RESULTS AND DISCUSSION

The results of the wash method gave the total number of mites present in a nut, whereas the template count gave a proportion of the live mite population under bracts (tepals) and on the nut surface. A positive correlation was found between the live mite and total mite populations (Table 1). The regression equation was $Y = 0.0038X + 13.812$ (Fig 1). Both methods showed a similar trend in mite population indicating their reliability as methods of assessment.

**Table 1: Comparison of coconut eriophyid mite population assessed using template count and water wash count methods**

| Palm No. | No. of mites (Mean of 24 nuts/palm) | |
|---|---|---|
| | Template method (4 sq. mm.) | Water wash method (10 ml) |
| 1 | 27.50 | 6720 |
| 2 | 42.83 | 4960 |
| 3 | 42.00 | 8480 |
| 4 | 49.33 | 5280 |
| 5 | 30.50 | 3680 |
| 6 | 17.00 | 2880 |
| 7 | 53.00 | 8160 |
| 8 | 33.50 | 8960 |
| 9 | 62.83 | 7680 |
| 10 | 24.00 | 2880 |
| 11 | 41.66 | 3680 |
| 12 | 13.33 | 3360 |
| 13 | 14.66 | 2880 |
| 14 | 27.00 | 6720 |
| 15 | 23.00 | 7360 |
| 16 | 54.00 | 8640 |
| 17 | 37.66 | 5280 |
| 18 | 44.83 | 5280 |
| 19 | 49.00 | 9280 |
| 20 | 48.00 | 8670 |
| R value = 0.61 | | |

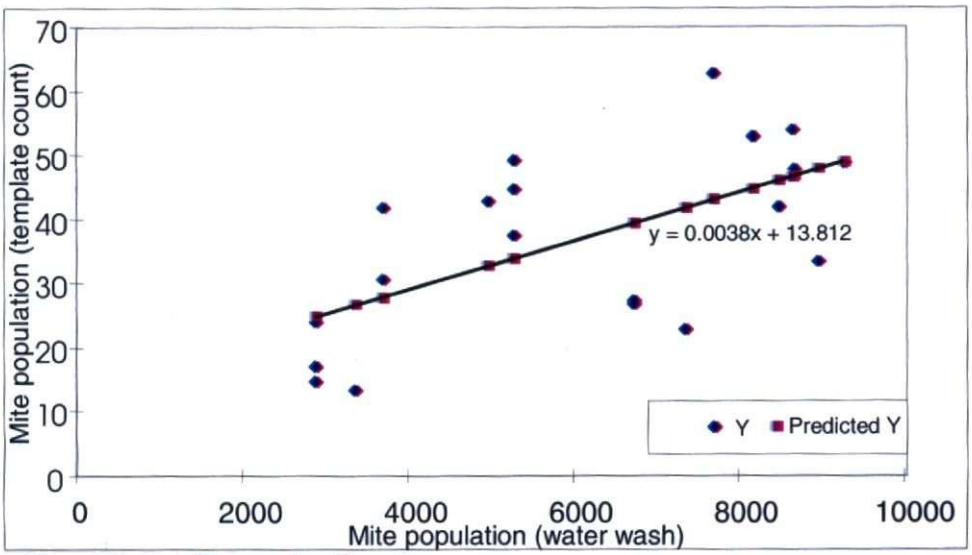


**Figure 1 : Regression Equation**

## REFERENCES


Perring, T. M., Farrar, C. A. and Oldfiekd, G.N. (1996).Sampling Techniques. In: Eriophyoid mites. Their biology, natural enemies and control. E. E. Lindquist, M. W. Sabelis and J. Bruin (eds).Elsevier sciences, Amstertdam, 367-376.

Ramaraju, K., Natarajan, K., Babu, P.C. S. and Ragini, G. T. M. (1999). Management of coconut eriophyid mite, *Aceria guerreronis* in Tamil Nadu. *J. Acarol* 14, 82-83.

Ramaraju, K., Natarajan, K., Babu, P.C.S. and Palaniswamy, S. (2000). Studies on coconut eriophyid mite *Aceria guerreronis* K. in Tamil Nadu, India. In: Proc. of the International workshop on coconut eriophyid mite (*Aceria guerreronis)*. Coconut Research Institute, Sri Lanka. 13-31.

Ramaraju, K., Bhaskaran, E.V. and Rabindra, R.J. (2001). Evaluation of insecticides against coconut eriophyid mite *Aceria guerreronis* Keifer. Paper presented at "*National Seminar on Emerging Trends in Pest and Diseases and their Management*" Oct 11-13, 2001, TNAU, Coimbatore. 83.

Sathiamma, B., Nair, C.P.R. and Koshy, P.K. (1998). Outbreak of a nut infesting Eriophyid mite, *Eriophyes guerreronis* (K.) in coconut plantation in India. *Indian Coconut J.*, 29 (2): 1-3.

Yothers, W.W. and Miller, R.L. (1934). Methods for determining rust mite abundance. *Proc.Fla.Soc.Hortic.Soc.*, 47, 53-55.