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http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2018): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme
(Labex Agro: ANR-10-LABX-0001-01)

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DESCRIPTION OF LIFE STAGES OF THE PREDATORY MITE *Phytoseiulus macropilis* (Banks) (Acari: Phytoseiidae)

by

V. Prasad

*Phytoseiulus macropilis* (Banks) has been reported from Cuba, Puerto Rico, the British West Indies, Canary Islands, Panama Canal Zone, and the United States (Smith and Summers, 1949; Cunliffe and Baker, 1953; Chant, 1959). It has been found as an important mite predator of the tetranychoid mites in Hawaii (Prasad, 1966). The biology of this predatory mite has been reported by Prasad (1967). Here, in this paper, all the life stages of *P. macropilis* are described in detail for the identification of this predator.

**Materials and Methods**

Studies on the life stages were carried out in the laboratory on the University of Hawai’i Campus, Honolulu. All the stages were collected from Chinese taro leaves (*Alocasia cucullata* (Lour) Schott) which were infested with *Tetranychus tumidus* Banks. These stages were mounted in Hoyer’s medium and were dried on a slide warming plate at 45°C for a week. The slides after drying were then ringed with “Zut” and all the stages were studied under a phase-contrast microscope using 450 to 102.5 × magnifications using transmitted light. The eggs were placed on adhesive tape fixed on a slide and examined under 360 × magnification using incident light. The outlines of the drawings were drawn with the help of a camera lucida and the details were completed using an oil-immersion objective.

The length measurements of the larvae, nymphs, and adults were taken between the posterior end of the body and the tip of the corniculus. The width measurements were taken just posterior to coxae III of the larvae and nymphs, and coxae IV of the adults. The legs were measured from the coxal base to the distal end of the tarsus. In each case 20 individuals were measured.

**Description of Life Stages**

The life stages of *P. macropilis* include the egg, larva, protonymph, deutonymph, and adult, both females and males. Sexes are indistinguishable in the immature stages. All stages of this species occur on the leaves among the prey.

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Figs. 1-2. — *Phytoseiulus macropilis* (Banks) : 1) Egg; 2) Larva.
Egg (Fig. 1) : Oval, averaging $0.223 \pm 0.010$ mm in length and $0.177 \pm 0.006$ mm in width. Freshly laid eggs light and/or deep orange in color.

Larva (Fig. 2) : Newly emerged hexapod larva white to light orange measuring $0.311 \pm 0.008$ mm in length and $0.197 \pm 0.004$ mm in width. Dorsal and ventral plates absent. Dorsum of idiosoma with ten pairs of setae of which four pair of 'D' setae in the dorsal row, five pairs of 'L' in the lateral row, and one pair of 'M' in the median row. Setae $D_4$, $L_4$ and $L_5$ very long and serrated averaging $0.103$, $0.107$, and $0.113$ mm in length, respectively. Remaining setae measure less than $0.017$ mm in length.

Venter of idiosoma with 13 setae : six 's' setae on podosoma, four 'e' setae between legs III and anus, and three 'a' setae near anus. Only two pairs of setae present on venter of gnathosoma. Peritremes and stigmata absent. A row of obliquely curved spinules present on dorsal surface of trochanters I and II and near dorsal proximal end of femur. II. These structures absent in the later stages. A stubby seta present on femur and genu of palpi. Legs I, II and III measure $0.320 \pm 0.021$, $0.253 \pm 0.012$, and $0.26 \pm 0.016$ mm in length respectively. The setae on legs number as follows:

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Protonymph (Fig. 3) : Similar to larva in color but slightly larger in size and with four pairs of legs. It measures $0.321 \pm 0.020$ mm in length and $0.204 \pm 0.015$ mm in width when newly moulted. Sixteen pairs of setae present on dorsum of idiosoma, five pairs of 'D' setae in dorsal row, eight pairs of 'L' setae in lateral row, one pair of 'M' setae in median row, and two pairs of 'S' setae in sublateral row. Setae $D_4$, $L_4$, $L_5$ and $L_6$ long and serrated. They measure $0.104$, $0.037$, $0.059$, and $0.041$ mm in length, respectively. Setae $L_6$, $L_7$, $L_8$, and $D_6$ closely set on posterior region of opisthosoma. Setae $L_n$, $M_3$ and $D_6$ measure less than $0.008$ mm in length.

Venter of idiosoma with 17 setae : six 's' setae on podosoma, four 'e' and two 'f' setae between coxae IV and anus, three 'a' setae near anus, and two 'v' setae on posterior margin of opisthosoma. A pair of 'f' setae absent in larva present in this stage. Three pairs of hypostomal setae plus one pair of capitular setae present on venter of gnathosoma. Palpal femur and genu with a stubby seta similar to that of larva. Peritremes present between legs III and IV and measure $0.025$ mm in length. Macrosetae, averaging $0.044$ and $0.073$ mm in length, present on genu and basitarsus of legs IV respectively. Legs I, II, III, IV measure $0.349 \pm 0.011$, $0.281 \pm 0.004$, $0.283 \pm 0.004$, and $0.368 \pm 0.009$ mm in length, respectively. The numbers of setae on the legs as follows:

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DEUTONYMPH (Fig. 4) : Similar to larva in colour. It measures $0.430 \pm 0.035$ mm in length and $0.265 \pm 0.016$ mm in width. Dorsal and ventral plates not developed. Dorsum of the idiosoma with 16 pairs of setae: five pairs of 'D' setae in dorsal row, eight pairs of 'L' setae in lateral row, one pair of 'M' setae in median row, and two pairs of 'S' setae in sublateral row. Setae $L_6$, $L_7$, $L_8$ and $D_6$ closely set in the protonymph are well separated in the deutonymph. Setae $D_4$, $L_4$, $L_5$, $L_6$ and $L_8$ very long and serrated and measure 0.117, 0.133, 0.069, 0.087, and 0.071 mm in length, respectively. Setae $D_6$ measure less than 0.008 mm in length.
FIG. 4. — *Phytoseiulus macropilis* (Banks) : Deutonymph.

Venter of idiosoma with 23 setae: six 's' and two 'm' setae on podosoma, and remaining setae on opisthosoma. On opisthosoma, two 'g' setae located between coxae IV near midventral line, four 'e' and two 'f' setae above anus, five 'e' setae surround anus, and two 'v' setae on posterior margin. Peritremes extend from coxa IV to coxa II. It measures 0.089 mm in length. Palpal femur with one and genu with two stubby setae on anterior margin. Macrosetae present on genu and basitarsus of leg IV and average 0.059 and 0.084 mm in length, respectively. Legs I, II, III and IV measure 0.429 ± 0.010, 0.347 ± 0.006, 0.356 ± 0.009, and 0.403 ± 0.011 mm in length. The numbers of setae on legs as follows:
FEMALE (Fig. 5): Globose in shape and light to deep red in colour. Newly emerged female with a milky white spot in posterior portion of body. Dorsum covered by a single sclerotized plate which has reticulate pattern along anterior and lateral margins. All plates on venter well developed. The female measures $0.583 \pm 0.027$ mm in length and $0.383 \pm 0.022$ mm in width one day after emergence. Dorsum of idiosoma with 14 pairs of setae on plate and two pairs of 'S' setae on interseutal membrane. On dorsal plate, five pairs of 'D' setae located in dorsal row, eight pairs of 'L' setae in lateral row, and one pair of 'M' setae in median row. Like nymphs, setae D$_4$, L$_4$, L$_6$, L$_8$, and L$_9$ very long and serrated. They measure 0.145, 0.167, 0.107, 0.130, and 0.111 mm in length, respectively. Setae D$_2$, D$_3$, and L$_3$ lightly serrated. Setae M$_1$ and D$_6$ very minute, less than 0.011 mm in length.

Venter of idiosoma with 23 setae: six 's' setae on sternal plate, two 'm' on metasternal plates, two 'g' setae on genital plate, four 'e' and two 'f' setae between genital and anal plates, five 'a' setae on ventrianal plate, and two 'v' setae on extreme posterior region. Sternal plate about as long as wide with two pairs of pores. In addition, one pair of pores present on metasternal plates. The genital plate relatively narrow. It measures 0.114 mm in length and 0.084 mm in width. Ventrianal plate measures 0.093 mm in length and 0.076 mm in width. Spermatheca located near coxa IV. It measures 0.051 mm in length. Peritremes extend from stigmata, located lateral to coxae IV, to level of coxae I. They measure 0.148 mm in length. Two pairs of metapodal platelets present posterior to coxae IV. The chelicerae with eight or nine teeth on fixed digits and two on movable digits. Macrosetae, measuring 0.072 and 0.103 mm, present on genu and basitarsus of legs IV respectively. Legs I, II, III and IV measure $0.520 \pm 0.005$, $0.430 \pm 0.006$, $0.444 \pm 0.004$, and $0.611 \pm 0.003$ mm in length. The numbers of setae on the legs as follows:

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MALE (Fig. 6): Similar to female in colour, shape, and dorsal chaetotaxy but smaller in size. Dorsum covered by a single sclerotized plate which measures 0.259 mm in length and 0.199 mm in width. Idiosoma measures $0.396 \pm 0.026$ mm in length and $0.258 \pm 0.018$ mm in width.

Venter of idiosoma with 21 setae: ten 's' setae on sternogenital plate, nine 'a' setae on ventrianal plate, and two 'v' setae on posterior margin of opisthosoma. Sterno-genital plate located between coxae I and IV with three pairs of pores. It measures 0.132 mm in length and 0.101 mm
FIG. 5. — *Phytoseiulus macropilis* (Banks) : Female.

in width. Genital opening present on anterior margin of sterno-genital plate. Ventrianal plate located posterior to sterno-genital plate and covers most of ventral opisthosoma. It measures 0.122 mm in length and 0.183 mm in width. Peritremal plates well developed. Peritremes extend from stigmata, located lateral to coxae IV, to coxae I and measure 0.095 mm in length. Each movable chela with a slender terminally forked spermatodactyl measuring 0.032 mm in length. Legs I, II, III and IV measure 0.382 ± 0.019, 0.317 ± 0.023, 0.337 ± 0.021 and 0.436 ± 0.020 mm in length. The number of setae on legs similar to that of female.

The life stages of *Phytoseiulus macropilis* (Banks) (Acarina: Phytoseiidae) include the egg, larva, protonymph, deutonymph, and adult male and female. All these stages are described and illustrated.

**ACKNOWLEDGEMENTS**

I would like to thank Dr. Frank H. Haramoto, Entomology Department, University of Hawaii, Honolulu, for providing the laboratory facilities and guiding the work.
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