

## ABSTRACT

**Bio- ecological studies on *Maconellicoccus hirsutus* (Green) and its exotic natural enemies, *Anagyrus kamali* (Moursi), *Cryptolaemus montrouzieri* (Mulsant) and *Scymnus coccivora* (Ayyar)**

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Laboratory, semi- field and field evaluations were carried out on the pink hibiscus mealybug, *Maconellicoccus hirsutus* Green (Homoptera: Pseudococcidae), *Anagyrus kamali* Moursi (Hymenoptera: Encyrtidae), *Cryptolaemus montrouzieri* Mulsant (Coleoptera: Coccinellidae) and *Scymnus coccivora* Ayyar (Coleoptera: Coccinellidae). These studies were conducted with the objective of deriving data on biological parameters and interactions with host- host plant and natural enemies for a new pest and its introduced natural enemy complex.

Total life cycles of 22- 25 days, 17- 18 days, 31days and 18 days were determined for *M. hirsutus*, *A. kamali*, *C. montrouzieri* and *S. coccivora* respectively, in the laboratory at  $27.0 \pm 3.0$  °C and  $58.0 \pm 3.0\%$  R.H. Lower threshold temperatures of 14.03 °C, 10.70 °C, 16.71 °C and 11.55 °C were derived for *M. hirsutus*, *A. kamali*, *C. montrouzieri* and *S. coccivora* respectively and equations of developmental rate with temperature were determined for each species.

Fecundity life tables were determined for each species and various life table parameters were also reported. The cohort generation times and net

reproductive rates for *M. hirsutus*, *A. kamali*, *C. montrouzieri* and *S. coccivora* were 34.91 and 18.45, 20.50 and 745.37, 42.92 and 286.93, and 36.74 and 220.02 respectively. The generation time of *A. kamali* was lowest (20 days) while that of *C. montrouzieri* was highest (40 days) in the host– natural enemy complexes investigated.

A field evaluation was conducted on *M. hirsutus* infested plants of *Hibiscus sabdariffa* L in a cage exclusion experiment with and without *A. kamali* and *C. montrouzieri*. This investigation demonstrated that a combination of *A. kamali* and *C. montrouzieri* exerted maximum control on both nymphal and adult stages of *M. hirsutus*. Highest yields of *H. sabdariffa* flowers and fruit in *M. hirsutus* infested treatments however, were obtained from *M. hirsutus* infested plants controlled solely by *A. kamali*.

An aggregation preference profile was developed in the laboratory for 24 plants affected by *M. hirsutus* in Trinidad. The most preferred plants were *H. rosa-sinensis* and *H. sabdariffa* while the *Citrus* spp. Were least preferred. Olfactory cues originating from infested plants as stimulus for host location was tested for both *A. kamali* and *C. montrouzieri* adults in an olfactometer. *A. kamali* females displayed the keenest olfactory senses and responded to semiochemicals emitted by uninfested parts of *M. hirsutus* infested plants. *C. montrouzieri* was tested as the representative coccinellid generalist predator and both sexes of adults unlike *A. kamali* were able to locate honeydew produced by *M. hirsutus*.

An evaluation of some of the common insecticides used for *M. hirsutus* control in Trinidad revealed that Fipronil® may be utilized under specific

conditions for general control of *M. hirsutus* in conjunction with *A. kamali*, *C. montrouzieri* and *S. coccivora*. A rhythm of hatch of *M. hirsutus* populations in the field over a three year period revealed a trend in crawler emergence. Crawlers emerged in the earlier part of the night during the early and late months of the year, while peak emergence occurred in the later part of the night and into the early morning during the middle months of the year.

**Key words:** *Maconellicoccus hirsutus*, *Anagyrus kamali*, *Cryptolaemus montrouzieri*, *Scymnus coccivora*, life tables, predator-prey interactions.

I am highly indebted to Mr. Richard Sookradge senior technician of the Department of Life Sciences for kindly accommodating my numerous cages of starter cultures in his laboratory and for supplying and servicing various physiological apparatus. Thanks are also extended for his contribution of the photographs used in this thesis. Thanks are due to the very efficient Secretaries of the unit, Mrs. Bernice Henry and Mrs. Roxanne Ali-Hassan and office assistant David Seneath who provided willing assistance at all times.

Technical and support staff, Mr. Bhumal Ramkissoon, Mr. Gerard Chen, Pamela Townsend and Mr. Calvin Khelawan provided ready assistance over the years and I am grateful for their support.

I wish to express my gratitude to Mr. Harideo Ramnathan of Piarco Meteorological Services who kindly provided weather data for a three year period and Mr. Phugoo and Mr. Jagdeo of the insect rearing unit of the Ministry of Agriculture, Point Fortin who provided parasitoids for starter cultures.