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Research Paper

Life Cycle Of Eutetranycus Orientalis (Acari: Tetranychidae) on Leaves of Tabernaemontana Coronaria (Klein) in West Bengal, India

Zoology

KEYWORDS :Eutetranychus orientalis, Tabernaemontana coronaria, West Bengal, India

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ABSTRACT

The life cycle of Eutetranychus orientalis was studied at 300C and 75% relative humidity on leaves of Tabernaemontana coronaria in West Bengal under laboratory condition. Observations were recorded on freshly laid eggs on leaves and continued till reaching adulthood. The eggs required an average of 8.6 days to develop into adults. The average range of longevity of adult was 15.63 days.

Introduction:

Flowers in India has social, cultural and religious values and recently India has taken up intensive cultivation of floriculture and thereby this sector has generated employment opportunity, promoting greater involvement of women and enhancement of export potentiality specially with regard to cut flowers. Major flower producing states in India are Karnataka, Tamilnadu and West Bengal which produce more than 2/3 of the total flower production in India. *Tabernaemontana coronaria,* is a flowering and ornamental plant as well as this plant has medicinal values and widely distributed in waste land, forest area. It is glabrous, evergreen, dichotomously branched shrub and belonging to the family Apocynaecae. This plant is widely distributed in different parts of India like West Bengal, upper Gangetic plain, Garhwal, Assam, Karnataka, Kerala and in Burma[1]. Different parts of this plants are belief to have antihelminthic, antifungal, antibacterial, antiviral properties[2]. The root of this plant is used in the treatment of Kapha, biliorsus etc. It is also used as aphrodisiac; tonic especially to the brain, liver and spleen[2] . Te root of tis plant are also used for relieving of toothache and also for inflammation [2,3]. Leaves of tis plant contains different constituents including indoles, alkaloids, phenols, steroids [4,5]. Thus, antioxidant play an important role to protect human body from reacting oxygen species [6]. In comparison of any other non-cultivated plant, *Tabernaemontana coronaria* are attacked by a large number of pests, of which in India, the most important is citrus brown mite, *Eutetranychus orientalis* (Klein) [7,8,9]. *Eutetranychus orientalis* because of sucking plant sap from the leaves, bark and fruits and tender shoots, causes heavy yield loss and the plants become unproductive. The high population of this mite species damages the leaf and defy the development of plant. The infested leaves sometimes are chocolaty brown and defoliate. So, the control of this pest is very essential for growth of the plant. But before taking any effective control measure, the knowledge of its biology or duration of different developmental stages, is essential. However, the data in this regard is very scarce and no study of life cycle of this mite was done on the leaves of *Tabernaemontana coronary*. So, the present study was done to investigate the life cycle of this mite with special reference to the duration of different developmental stages for controlling this pest.

Materials and Methods:

Adult mites were isolated from laboratory stock culture of *Eutetranychus orientalis*, maintained on excised leaf discs (3 cm^2) and were placed on a water saturated cotton swab in a Petridish (3"diameter). Leaf discs were made with fresh leaf of *Tabernaemontana coronaria* without mite infestation. The cotton bed was kept wet by soaking with water twice daily so that the discs remained fresh. Mass culture of *Eutetranychus orientalis* was set up under controlled condition in the laboratory at 30°C and 75% R.H (relative humidity) maintained in a BOD (Biological Oxygen Demand) incubator. All the Petridishes were kept in BOD incubator at the constant temperature and humidity.

To determine the duration of life stages , 20 freshly laid eggs were placed in 20 separate Petridishes and observations were recorded at 24 hours interval under stereo-binocular microscope. The time of development of different stages from egg to adult was recorded. Te data pertaining to different life stages were taken from those cases when the complete life cycle could reach and these also gave the percentage of mortality at different stages. Similarly, for computation and statistical analysis of the data, only those cases where life cycle was completed was used. In order to determine pre-oviposition, ovipoisition and post oviposition period , a separate experiment was designed. For these 10 Petridishes (3" diameter) were taken and a leaf disc of *Tabernaemontana coronaria* placed on a water saturated cotton swab in it and in each these a pair of newly emerged virgin adult male and female was released and observation were recorded on every 24 hours. While taking observations under stereo-binocular microscope, the number of newly laid eggs was counted in each of these Petridish and thereafter the eggs were destroyed by pricking with a needle. This was continued till cessation of egg laying. The time between the deposition of first and last egg was defined as the oviposition period. The time from cessation of egg laying till the death of the female was considered as post-oviposition period while the period from reaching to the adulthood and before starting egg laying was considered as pre-oviposition period. The longevity of adult female was determined by setting up a separate experiment by releasing a female deutonymph and continued till it died. For each, 10 replication were maintained. The data was subjected to statistical analysis which was done by SPSS 10.0 for windows.

Result:

Eggs required on average of 8.6 days to develop into adults. Eleven of the 20 eggs observed (55%) became adult. The sex ratio of male and female was 1: 2.65. Mortality at the larval and protonymphal stage was 35% and 20% respectively. There was no mortality at deutonymph stage. Duration of egg stage was approximately 2.4 days followed by the larval 1.0 days, protonymphal and deutonymphal stages each accounting for 3.4 an 1.8 days respectively (Table 1.). The pre oviposition period was found to be 1.4 days, oviposition period 4.8 days and post oviposition period 0.4 days. The rate of oviposition was 5.41 egg/days/female. The average longevity of adults was 15.63 days.

Table 1: Life-cycle of *Eutetranychus orientalis* at 30°C and 75% RH

Name of stage	Duration (Mean ±S.E)	Range
Egg	2.4± 0.16	2-3
Larva	1 ±0	1
Protonymph	3.4 ± 0.16	3-4
Deutonymph	1.8 ± 0.13	1-2
Egg-Adult	8.6 ± 0.16	8-9
Fecundity	5.41 ± 0.22	4.8-6
Pre-oviposition	1.4 ± 0.51	1-3
Oviposition	4.8 ± 0.49	3-6
Post-oviposition	0.4 ± 0.24	1
Longevity of adult	15.63 ± 1.12	14-17

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Discussion:

Extensive research work has been done on the biology of different species of spider mites (Tetranychidae) occurring on different plants. But unfortunately, the information regarding the research work on biology of *Eutetranychus orientalis* infesting *Tabernaemontana coronaria*, is still fragmentary. The present investigation revealed that the total time taken to complete the life cycle (egg to adult) was 8.6 days at 30^0C and 75 % RH on leaves of *Tabernaemontana coronaria* . In case of time required for development from egg to adult, the results of the present investigation agrees with the results of Kaimal *et al.*[10]who worked on the biology of *Eutetranychus orientalis* infesting Neem at 30^0C and 70% RH. According to him, total time taken to complete the life cycle was 8-9 days but in case of pre-oviposition, oviposition periods are concerned, the present findings disagree with the results of Kaimal *et al*[10]**.** There were substantial differences as evident from the fact that the duration of these periods was 0.5 and 7.5 days , respectively[10] contrary to 1.4 and 4.8 6.4 days , respectively as observed in the present study. So far as the post-oviposition period is concerned , both the values are very close to each other as apparent from the fact that it was 0.4 in case of both the study. As regards, duration of other stages like incubation period, larval period and protonymphal periods since no data were provided by Kaimal *et al.* [10], the data of the present study could not be compared with the latter. The result of the present investigation also agrees with result of Dhooria [11], and Rasmy[7]. According to them, the oviposition period of *Eutetranychus orientalis* is much more similar. The present study revealed that in comparison of other works , the life cycle of *Eutetranychus orientalis* was completed in 8.6 days at 30^0C. The present study was conducted in different environmental condition and also on different host with those of other works and that may be the rationale for differences in the result. The biology and growth of plant mites depend on the availability of temperature, RH and food, and these factors decide their life-cycle pattern, their abundance and population fluctuations in different seasons. *Tabernaemontana coronaria*, being one of the medicinally important flowering plant, this has to be considered seriously , as *Eutetranychus orientalis* would become a great threat to this plant.

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