

Biology of the parthenium infested mealybug [*Ferrisia consobrina* Williams and Watson] (Pseudococcidae: Hemiptera)

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Ferrisia consobrina Williams and Watson is widely distributed in Neotropical region: Argentina, Bahamas, Bermuda, Cuba, Jamaica, Mexico, Peru, Trinidad, Newzealand and Pacific region, Palaearctic region, Ethiopian region (Ben-Dov, 1991a, b; Williams & Granara de Willink, 1992). It is reported to attack many plant and weed species belonging to 23 families, these including *Rebutia*, *Canna indica*, *Chenopodium mariana*, *Erigeron*, *Parthenium Hysterophorus*, *Tagetes*, *Brassica rapa*, *Euphorbia hirta*, *Manihot esculenta*, *Arachis hypogaea*, *Phaseolus vulgaris*, *Gossypium hirsutum*, *Bougainvillea spectabilis*, *Citrus paradise*, *Lycopersicon esculentum*, *Solanum tuberosum* and *Tectona grandis* (Ben-Dov, 1991a , b; Williams & Granara de Willink, 1992).

It is found that *F. consobrina* feed on leaves, stems and flower heads of parthenium and there by produce dieback symptom and resulting to death (Arshad *et al.*, 2006). So, they have the capability to act as a good biocontrol agent for parthenium control. For this, their mass multiplication and to know any effect on cultivated as well as natural vegetation is very important. As the study on biology of *F. consobrina* was not carried out earlier on sprouted potato tubers. Therefore, the present study had been carried out to reveal the nymphal development of male and female, pre-oviposition period, oviposition period and fecundity on sprouted potatoes under laboratory condition.

The mealybugs were collected from parthenium plant and were reared on sprouted tubers of potato (*Solanum tuberosum* Linn.) in the Entomological laboratory, Bidhan Chandra Krishi Viswavidyalaya, West Bengal, India at room temperature (21- 24°C) and relative humidity (71-99 % R. H.) during November-December 2009. The first instar nymphs hatched out within 24 hrs. There were three cultures, each in a beaker, the mouth of which was covered and secured with a piece of cloth and rubber band. Daily observations were made on the ecdysis of nymphs, sex ratio, pre-oviposition and

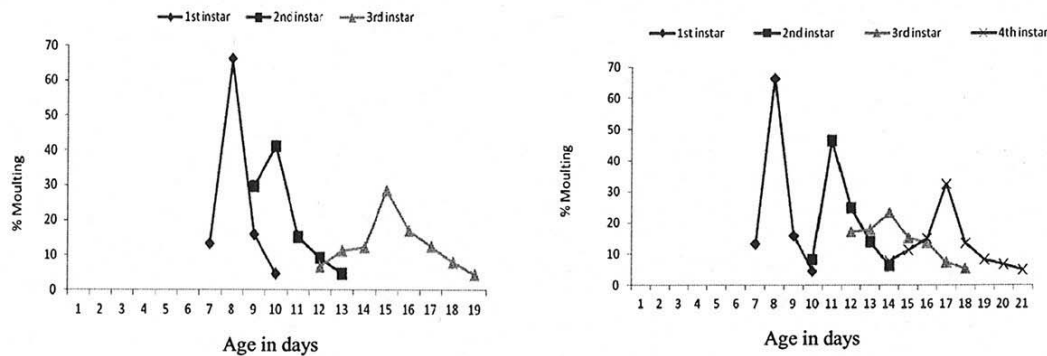
oviposition period, fecundity and incubation period of eggs.

Adult female *F. consobrina* were oval bodied, yellowish in colour insect with waxy particle found on their body. The body is about 3.53 mm long and 2.39 mm wide. Dorsum is with only one pair of cerarii on the prominent anal lobe. The anal lobe with two conical setae and 8-10 auxiliary setae and 30- 34 trilocular disc pores. The numbers of auxiliary setae on the remaining body segments are two. Dorsal surface with setae of various sizes, blunt, slightly knobbed or spatulate. The male possessed a pair of short waxy anal projection.

The studies on the biology of mealybug, *F. consobrina* on sprouted potato gave some interesting results. The data on the duration of different nymphal stages of female and male and range of temperature and humidity for each have been provided in table- 1. From the experiment, it was found that the female nymphs moulted three times for becoming adults while the male required four moulting. About 95% of the first instar nymphs, the sexes of which were indistinguishable, moulted at the age of 7-9 days. The sexes of second instar nymph could not be recognized easily without certain attention. The moulting of about 71% of female nymphs was completed at the age of 9-10 days. The oval bodied third instar nymphal females completed ecdysis at the age 12-19 days, and about 58% of them did so in 15-17 days (Fig. 1). The average age of moulting was 15.34 ± 1.76 days (Table 1). The second instar of males were completed this stage at the age of 10-14 days and almost 71% moulting occurred in 11-12 days. Later, the second instar nymphs of male generally migrated to the isolated places of potato. There they moulted and enter into next instar by making white cocoons. The third instar completed at the age of 12-18 days. The fourth instar males were in cocoon and it completed at the age of 14-21 days. The adult male was dipterous and brownish in colour. They had well differentiated head, thorax and abdomen, a pair of conspicuous white wings and two long white hair like waxy caudal filaments. Their longevity was only 2-3 days.

Table 1: Life stages duration of female and male nymphs of *Ferrisia consobrina* Williams and Watson

Particulars	Moulting of different nymphal instars at the age (Days)					
	Female			Male		
	1 st Instar	2 nd Instar	3 rd Instar	2 nd Instar	3 rd Instar	4 th Instar
Range	7-10	9-13	12-19	10-14	12-18	14-21
Mean (\pm S.D.)	8.09 (\pm 0.67)	10.14 (\pm 1.02)	15.34 (\pm 1.76)	11.62 (\pm 0.98)	14.41 (\pm 1.73)	17.04 (\pm 1.98)
Individual observed (No.)	90	50	47	40	36	25
Temp. range ($^{\circ}$ C)	23-24	21-24	21-23	21-24	22-23	21-23
R. H. (%)	71-99	71-99	71-89	82-99	71-89	69-82

**Fig. 1: *F. consobrina* nymphs and their development, female (left) male (right)**

The female and male nymphs completed development in 12-19 (15.34 ± 1.76) days and 14-21 (17.04 ± 1.98) days respectively at 21-24 $^{\circ}$ C temp and 71- 99% R. H. The ratio of male: female was 1: 1.25. The duration of preoviposition and oviposition periods were 4-8 (5.7 ± 0.60) days and 4-6 (4.6 ± 0.80) days, respectively. The mode of reproduction was sexual and ovoviviparous. The pre-oviposition and oviposition period were 4-8 (5.7 ± 0.60) days and 4- 6 (4.6 ± 0.80) days respectively. Fecundity was 494 (467-507) nymphs per female. *F. consobrina* differs from *F. virgata* in possessing a few multilocular disc pores adjacent to the vulva only, whereas in *F. virgata* they are more numerous, also occupying the median areas of segment six (Williams and Watson, 1988). In 1991 Biswas studied the biology of *F. virgata* on sprouted potato. He found that the duration for completion of development of male and female were 25-35 (29 ± 3.08) and 24-31 (28.19 ± 2.14), days respectively at 28.3- 30 $^{\circ}$ C and 82- 93% R. H. He mentioned the male female ratio and fecundity rate as 1: 3.1 and 311-336 (302.20 ± 23.33), respectively.

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