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A Preliminary Study on *Ferrisia (Ferrisiana) virgata* Ckll., The White Mealy Bug (Homoptera : Pseudococcidae) In Madya Pradesh.

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Introduction : *Ferrisia (Ferrisiana) virgata* Ckll is a widespread pest of many ornamental plants, fruit crops and some field crops as recorded by Hosny (1943) and Mohammad Ali (1961). Some aspects of its bionomics were studied by Betrem (1936) in Java; Das *et. al.* (1948) in India; Voelcker (1948) in Gold Coast and Highland (1956) in Maryland. Its persistent occurrence in Madhya Pradesh during recent years and insufficiently known bionomics led to the studies on its host plants, bionomics and control, the preliminary results of which are reported here.

Materials and Methods : The studies on its bionomics were conducted at room temperature during the period from December, 1965 to March, 1966. The mean minimum room temperatures during these months ranged from 65.4 to 79.0°F and 71.3 to 85.3°F, respectively. The pest was reared on small potted brinjal plants and observations were taken daily. The host plants were surveyed at five different campi of the Vishwa Vidyalaya in M.P. namely, Jabalpur, Sehore, Gwalior, Rewa and Raipur and have been classified under high,

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moderate and low intensities of infestation. The activity and incidence of the pest were recorded throughout the year from August 1965 to July 1966 for studying its seasonal history. Natural enemies of the pest were recorded and few modern insecticides were tried in the field to evolve its effective chemical control.

Results and Discussion: In India, the pest has been reported to occur in Assam, Bengal, Bihar, Bombay, Hyderabad, Madhya Pradesh, Madras and Mysore (Mohammad Ali, 1961). In M.P. the pest has been recorded from Gwalior, Jabalpur, Raipur, Rewa and Sehore.

Host plants: During the course of the study the pest was found feeding on 27 species of host plants, mostly ornamental and horticultural plants, as listed below under 3 heads. Those marked with asterisk are new records.

(a) *With high infestation* :- *Acalypha wilkesiana*, *Coccinia cordifolia*, **Colocasia* sp., *Croton latifolium*, *Croton tortuosum*, *Daedalacanthus nervosus*, **Eranthemum* sp., **Ipomoea palmata* and **Trichosanthes dioecia*.

(b) *With moderate infestation* :- **Coleus* sp., **Dolichos lablab*, **Gerbera* sp., *Gossypium* sp. (Cotton), *Lantana* sp., **Lilium* sp., *Musa sapientum*, **Portulacca grandiflora*, **Solanum melongena* and *Tagetes erecta*.

(c) *With low infestation* :- **Begonia* sp., **Brachycome* sp., **Cassia* sp., *Casuarina equisetifolia*, **Celosia cristata*, *Citrus* sp., **Hibiscus chinensis* and **Solanum nigrum*.

The polyphagous nature of the pest has also been recorded by previous workers. Rao (1929) noted it on pepper (*Piper nigrum*) at Coimbatore, Hosny (1943) on 60 different host plants belonging to 38 families in Egypt, Abraham (1959) on Cashew crop (*Anacardium occidentale*) in West Coast of India, and Mohammad Ali (1961) on 13 different host plants in Bihar, eleven of these being new records.

Nature & Extent of Damage: Nymphs and adult females suck the plant sap from the lower surface of leaves, tender shoots and in severe infestation from fruits also (Plate 1). In case of heavy infestation 100% plants may be infested. The infested leaves gradually wither and fall off and the plants may completely die.

Life History: (i) *Egg laying and incubation period:* Female lays eggs under its body and not in ovisac. The incubation period was very short, less than one day (usually 3-4 hours). Betrem (1936) also recorded it to be less than one day. Das *et al.* (1948) recorded it of 19-29 minutes.

(ii) *Post embryonic development:* Female nymphs moulted three times to attain maturity. Duration of the three nymphal instars and total nymphal



PLATE 1. Legend : *Acalypha* shoot severely infested with *F. virgata* ckll.

period, as seen in 6 females, ranged from 12–20 days, 5–14 days, 8–13 days and 26–47 days (average 30.3 days), respectively, during December to February. Female in apterous with two long prominent waxy filaments at the posterior end and a number of waxy hairs over the body, which is covered with white waxy powder leaving a prominent blackish patch on the dorsum of posterior end of the body. The full grown adult measures 4.3 mm. \times 2.1 mm. Females are active and mobile throughout the period of their development.

Development in males differs much from that in females, having one additional moult and complete metamorphosis. Male nymphs moulted four times till emergence of adults. Duration of 1st instar ranged from 12–21 days. 4 to 18 days after the 1st moult, the male nymph starts forming white silken cocoon within which it undergoes three more moults to emerge as adult. Second moult is passed in 2–4 days after starting the cocoon formation. The exuviae of third and fourth moults differ from those of the first and second moults in being comparatively longer with conspicuous thoracic legs. The duration of male development inside cocoon and from egg to adult ranged from 13–20 days and 31–57 days (average 39.8 days), respectively during December to February. Longevity of adult males ranged from 1–3 days (Table 1) Adult males are slender, delicate, smoky brown with a single pair of wings

(mesothoracic) and two long waxy anal filaments. Adult measures 2.2 mm × 0.6 mm

TABLE 1.

Duration of male development, longevity and total life cycle (in days)

S. No.	Date of emergence of nymphs	Duration of first instar	Duration from 1st moult to cocoon formation	Duration of male development in side cocoon	Adult longevity	Total life cycle (egg to adult)
1.	23-12-65	21	16	20	3	57
2.	16-2-55	20	18	19	1	57
3.	16-12-65	14	5	16	1	45
4.	29-1-66	12	4	15	1	31
5.	29-1-66	12	4	15	1	31
6.	29-1-66	12	5	15	1	32
7.	29-1-66	12	5	16	2	33
8.	29-1-66	12	8	13	2	33

These results confirm the findings of Das *et al.* (1948) and Highland (1956) who also recorded three moults in females and four in males and average development durations of 28.8 days for female and 38 days for males (Highland, 1956). Das *et al.* (1948) in their studies have recorded it of 18-19 days in both sexes during September-October.

(iii) *Preoviposition period and duration from egg hatching to first oviposition*: Preoviposition period ranged from 12-23 days (average 15.3 days) during February to middle of March. Duration from hatching of eggs to first oviposition ranged from 38-72 days during middle of December to middle of March, which was found to be comparatively more than the previous records of 5-6 weeks by Begemann (1929) in Dutch East Indies 28-49 days by Betrem (1936) in Java, 44 days by Voelcker (1948) in Gold Coast and 42-56 days by Highland (1956) in Maryland.

(iv) *Fecundity, oviposition and postoviposition periods*: The total number of eggs laid per female, as seen in 7 cases, varied from 185-409 (average 295.5) eggs. The oviposition period varied from 20-29 (Mean 20.7) days and post oviposition period from 1-5 days during March. Betrem (1936) recorded over 300 eggs as average fecundity in Java. Bindra and Saksega (1962) recorded a total of 254 eggs in seven days at Gwalior.

(v) *Longevity of adult females*: Longevity of adult female, as seen in 5 cases, ranged from 36-53 days (average 40.4 days) during February to beginning of April.

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Seasonal History: The pest was found most active and abundant in its various stages on a large number of host plants during the months of August–November, 1965. After the 1st week of December, 1965 to end of January, 1966 the activity of the pest came to stand still and mostly full grown females were observed on preferred host plants like *Acalypha*. From beginning of February, 1966 the pest resumed activity, multiplied and got dispersed to various other plants. During March to April, 1966 all stages of the pest were again recorded in fairly large numbers on various host plants, but the population was not as high as that during August–November, 1965. In months of May and June, 1966 activity and population of the pest were again considerably decreased and only a few adult females were found which did not lay eggs till middle of July, 1966 when the activity again recommenced.

Control: In nature, large numbers of nymphs were consumed by the grubs and adults of a coccinellid predator viz. *Nephus regularis* Sic., during the months of November to middle of December, 1965 and again from March to May, 1966 bringing about an appreciable reduction in the pest population in subsequent months. Few grubs and adults of *Pullus coccidivora* Ayyar were also found feeding on the pest.

Parathion, Basudin, Malathion and Dimethoate (Rogor) emulsions were tried under field conditions at different concentrations. Parathion and Dimethoate each at concentration of 0.04 per cent effectively controlled the pest.

Summary: The pest *Ferrisia (Ferrisiana) virgata* Ckll., was recorded on 27 different host plants in M.P. On oviposition the eggs hatched out in 3 to 4 hours. Female and male nymphs moulted 3 and 4 times, respectively to attain maturity. Duration of female and male development varied from 26 to 47 days and 31 to 57 days, respectively. Longevity of female ranged from 36 to 53 days and of male only 1 to 3 days. Fecundity ranged from 185 to 409 (mean 295.5 eggs) during the oviposition period of 20–29 (mean 20.7) days. The pest was found most active and populous during August–November, 1965 and during March–April, 1966. During December, 1965 to January, 1966 and May to June, 1966 the pest was found mostly as adult females. Grubs and adults of two coccinellid beetles viz. *Nephus regularis* Sic. and *Pullus coccidivora* Ayyar were recorded as predators on the pest. Parathion and Dimethoate emulsions at 0.04 per cent concentration proved effective against the pest.

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