

## LIFE HISTORY OF *APHIS POMI* DE GEER (GREEN APPLE APHID) ON APPLE PLANTATIONS IN JAMMU PROVINCE, J&K, INDIA

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**ABSTRACT:** In the present study, life history of green apple aphid was studied during July to November months on apple host and the data on total life period (pre reproductive, reproductive and post reproductive periods) was recorded. Total progeny produced and total nymphal period was also calculated. The detailed biology of the pest has been recorded for the first time in Jammu province of J&K state on apple plants.

**KEY WORDS:** *Aphis pomi* De Geer, life history, green apple aphid.

Jammu and Kashmir has thus been more favourably located for growth of apples and other temperate fruits since times immemorial. Jammu and Kashmir probably is the most ideal unparalleled area in the world with respect to soil, climate and environment that suits the culture and preservation of temperate fruits.

Aphid pests cause considerable loss to horticultural crops by sucking their sap and transmitting many diseases (Kennedy et al., 1962) Aphids have adapted their life cycle to different geographical regions depending upon the environmental conditions prevailing in the area of study. Though sufficient work with regard to biology of *Aphis pomi* has been done by earlier workers in some parts like Baker & Turner (1916) in North America and Gautam & Kumari (2004) in Shimla, but detailed information on the biology of this pest in Jammu province of Jammu and Kashmir State is not yet known.

In the present investigation, the life history of green apple aphids was studied on the red delicious cultivar of apple plantations from August to October months as heavy infestation of the pest was recorded in the fields during the said period. Present studies by the author may prove useful in ascertaining the adaptability of this aphid *Aphis pomi* to its host plant in the area of present study.

### MATERIALS AND METHODS

*Aphis pomi* is economically important and widely distributed pests of apple plantations in Jammu province. During present study, a stock culture aphid was maintained on apple nursery plants grown in the fields. Colonies were established on excised twigs under laboratory conditions from adult apterous morphs (nymphs) collected from the field. From the laboratory colonies, individual aphids were taken to be reared individually. This was done by placing a single apterous parthenogenetic adult on a damaged portion of an excised delicious apple twig confined within a sleeve cage.

The twigs with caged aphids were kept in plastic vials half filled with water and placed in a jar. Each caged aphid was examined every 24 hours and the adult female and excess nymphs removed, leaving a single nymph on each twig. The

development of each nymph was then studied daily under a microscope and exuvae were removed after each moult. However aphids were also preserved in 80% alcohol for further morphometric studies. Morphological characters were measured using an ocular micrometer attached to a binocular microscope. Observations were made on nymphal period, pre reproductive, reproductive and post reproductive periods from July to October months.

## RESULTS AND DISCUSSIONS

Green apple aphid populations build slowly on apples in early spring (bloom, petal, fall), which increases rapidly with the rise in temperature. Their number is more during July and early August. Depending on weather conditions, one life cycle takes two to three weeks in the area of author on apple plantations. There are many generations per year.

Green apple aphids usually remain on apple plants throughout the summer. The infestation of green apple aphid was found to be more in the apical parts of the plants (Fig. 1-1,2). Both nymphs and adults suck the sap from leaves, twigs, branches and young fruits, as a result of which the affected leaves curl up, blossoms shed and the young fruits drop prematurely and the quality of fruits is greatly impaired. Severely infected plants show stunted growth.

First generation usually consists of wingless individuals but eventually winged individuals appear which also migrates to other adjoining host plants like pear, peach etc growing in the vicinity of apple trees in the study area and the reproductive process continues rapidly thereby building enormous populations of aphids in a relatively short span of time.

Aphids generally overwinter in the egg stage which hatches in the spring into the females that reproduce parthenogenetically and give birth to young ones. Several generations of the pest are being produced during the season in this way. Baker & Turner (1916) and Gautam & Kumari (2004) during their studies had reported that the aphids passed through a complex life cycle involving polymorphism, viviparity and telescoping of generations. The present author during her studies has seen that green apple aphids have a number of stages like eggs, stem mothers, wingless viviparous females, winged viviparous females, males and oviparous females in the study area.

All the newly hatched nymphs are females who begin to feed immediately on growing leaves, and are initially seen on terminal shoots, moving later to older cluster leaves. After feeding for about two weeks and moulting several times, nymphs mature into wingless adults that reproduce without mating. These adults give birth to live young, with populations building rapidly.

Parthenogenetic wingless and winged forms were recorded from the fields. Wingless forms are parthenogenetic viviparous and their progeny also consisted of only parthenogenetic viviparous females. The average nymphal duration of this species is  $13.50 \pm 0.38$  days which ranged from a minimum of 10.0 days to a maximum of 14.0 days. The average pre-reproductive, reproductive and post-reproductive periods of this aphid are  $12.95 \pm 0.27$ ,  $17.50 \pm 0.47$  and  $1.45 \pm 0.17$  days respectively (Table 1). The reproductive period starts with the laying of young ones and the progeny produced by a female varied from 19-79 aphids and averaged  $47.80 \pm 4.39$  aphids (Table 1).

Maximum number of nymphs laid in a day averaged  $5.00 \pm 0.39$  from a minimum of 4.0 nymphs to a maximum of 7.0 nymphs (Table 1). However, Baker & Turner (1916) also reported that the wingless viviparous females begin reproduction about 24 hrs after becoming mature and the average reproduction

varied greatly with season. According to these workers, the maximum reproduction was more than 16 for one day. These variations in number of nymphs in a day may be attributed to different prevailing weather conditions in different study areas.

In the present studies by the author in Jammu province *Aphis pomi*, the green apple aphid takes an average of  $31.22 \pm 0.10$  days to complete one life cycle on apple plants as host (Table 1) whereas earlier workers like Baker & Turner (1916) and Gautam & Kumari (2004) reported that the average total duration of lifecycle of this pest for the entire season was 30.9 days in North America and 24.15 to 42.35 days in Himachal Pradesh. During these observations by the present investigator, only apterous parthenogenetic viviparous morphs were studied in detail however winged forms of this pest also exist in the study area but their biology could not be studied in detail.

Further extensive studies are required to study the biology of different morphs as well as their cytology and ecology in this region to minimize the infestation and also to devise the strategies of IPM for effective control of green apple aphid.

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Table 1. Life cycle (Pre-reproductive, reproductive and post-reproductive periods) of green apple aphid (*Aphis pomi* de Geer) on apple plantations in Jammu region.

Particulars	Range (in days)		Mean $\pm$ SE
	Min.	Max.	
Total nymphal period (in days)	10.00	14.00	13.50 $\pm$ 0.38
Period between last moult and beginning of reproduction (in days)	1.00	2.00	1.35 $\pm$ 0.13
Total pre-reproductive period (in days)	12.5	14.0	12.95 $\pm$ 0.27
Total reproductive period (in days)	16.0	20.0	17.50 $\pm$ 0.47
Total post-reproductive period (in days)	1.00	2.5	1.45 $\pm$ 0.17
Total life period (in days)	30.0	38.5	31.22 $\pm$ 0.10
Total progeny produced	19.0	79.0	47.80 $\pm$ 4.39
Max. no. of nymphs laid in one day	4.00	7.00	5.00 $\pm$ 0.39

