STUDY ON BIOLOGY OF *MACROSIPHUM AVENAE* (FABRICIOUS) (HOMOPTERA; APHIDIDAE) AT KIRTIPUR

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INTRODUCTION

The aphids (Family, Aphididae) constitute a large group of soft bodied homopteran insects. They are recognised easily by their smaller pear-shaped body and living in group. They have fairly long antennae, a proboscis on the head and a pair of cornicles the "honey tubes" towards the posterior end of the abdomen secreting honey dew to which the ants are attracted. They may be winged or wingless, the latter being predominant in its population. They usually pass their life on the young shoots and foliage of a variety of plants sucking up the plant juice except a few species that live on roots (*Trama sp.*). The infested plants may show stunted growth, curling of leaves and sometimes gall or pseudogall formation on the leaves and stems. Aphids serve as vectors of a number of important plant diseases and several viral diseases are transmitted by them.

Macroiphum avenae is a pest of wheat (*Triticum vulgare*) and millet (*Eleusine coracana*) in Nepal (Sharma, 1968). It is green in colour and was found on wheat crop throughout Kathmandu Valley. It appears in the fields of cereal grain each year, but only occasionally cause feeding damage of economic importance. It can also transmit viral diseases.

Biology of *Macrosiphum avenae* was not studied previously in Nepal and therefore the present study was carried out with an aim to know about their developmental and reproductive periods, fecundity, adult longevity, etc., because all these factors are quite essential to device the ways of their control.

REVIEW

Little works have been done in Nepal on biology of various kinds of aphids. In 1966, Rana and Sharma studied the biology of wooly apple aphid (*Eriosoma lanigerum*, H.S.M.) in Nepal and also suggested its control methods. In 1968, Sharma reported some biological notes on aphids of Nepal. In 1971, Atwal and Dhingra performed biological studies of the common rose aphid, *Macrosiphum rosaeformis* in India. Later on Sharma and Khatri (1971-76) studied the biology of the pea aphid (*Acyrthosiphon pisum*, Harris) on sweet pea, *Lithyrus odoratus* at Khumaltar (Kathmandu). Again in 1979, Sharma and Khatri studied the biology and control of the mustard aphid (*Lipaphis erysimi*, Kltb.) on mustard plant at Khumaltar.

MATERIALS AND METHODS

Study on biology of *Macrosiphum avenae* was carried out in the laboratory conditions of the Central Department of zoology at Kirtipur from February to April 1987 for dissertation work of the Master Degree in Zoology from T.U.

REARING PROCESS FOR THE STUDY OF APHID BIOLOGY

For the study of biology of *Macrosiphum avenae* a single healthy looking apterous and parthenogenetic viviparous female was selected from wheat plant growing in the field at Kirtipur and a clone was established in the laboratory in about a month time under room temperature. An idea of taking a single parthenogenetic female was to help in not missing of other species of aphids in the study.

For establishing a clone of the selected aphid, a plastic pot (size 250 ml.) with 100 ml. of tap water was taken and a piece of 3 cm. long younger wheat leaf was kept on the surface of water so that the leaf would not dry. Then the selected viviparous, parthenogenetic female was kept on the leaf surface and the mouth of the pot was covered with a piece of fine cotton cloth and then bounded by a rubber band. When the adult aphid gave birth to young nymphs after a couple of days, paternal aphid was removed and the nymphs were reared as above. To provide fresh food, the old leaf piece was replaced by fresh one everyday in the morning and the water was replaced after every 2-3 days. A fine camel hair brush was used to transfer the aphids from the older leaf to the new one. After the fourth moult, the aphids were transferred on separate leaf piece in the separate pot and was allowed to propagate. The process was repeated again and again to get enough aphids for a period of one month for the study of its biology.

Rearing process of *Macrosiphum avenae* for the study of its biology was the same as described above and 30 replicates of such types were maintained during the entire rearing process but only 20 aphids survived and 10 died. During this process the number of nymphs produced by each adult female and their longevity were also recorded.

RESULTS AND DISCUSSION

During spring season (Feb.-April, 1987) at Kirtipur, the apterous females were found giving birth to younger ones called nymphs parthenogenetically which underwent four moultings to attain the adult size. Duration of various development stages and percentage survival of this species as per recorded:

Table-1: Average duration of various development stages and percentage survival of apterous forms of *Macrosiphum avenae* during spring season.

Sample No.	Average duration of nymphal instars in days				Average Prematura-tion period in days	Average Total Develop-mental period in days	Average Total Percentage Survival during development
	1st	2nd	3rd	4th			
1-20	2	1.9	2.2	2.3	2.5	10.9	67%

It is clear from the table-1 that the average durations of 1st, 2nd, 3rd, and 4th instars were 2, 1.9, 2.2, and 2.3 days respectively. In this way the average duration of all the four instars were found to be more or less the same.

Pre-maturation period was found to be varied from one to four days with an average of 2.5 days. Average duration of development period was found to be 10.9 days, ranging from 10 to 13 days, while majority of them attained adult stage on 10th or 11th day after being born.

Under laboratory conditions (average temperature 20.65°c) percentage survival of immature stages was found to be 67.00 percent.

Reproduction and longevity of adults of *Macrosipuhm avenae:*

Table-2 : Average reproduction and longevity in days of apterous *Macrosiphum avenae* adults during spring season.

Pot No.	Duration of Reproductive period in days	Average Total Fecundity in Number	Rate of Reproduction = Total Fecundity / Duration of Reproductive period	Average Duration of Post reproductive period in days	Average Adult longevity in days
1-18	13.00	48.16	3.80	2.94	15.94

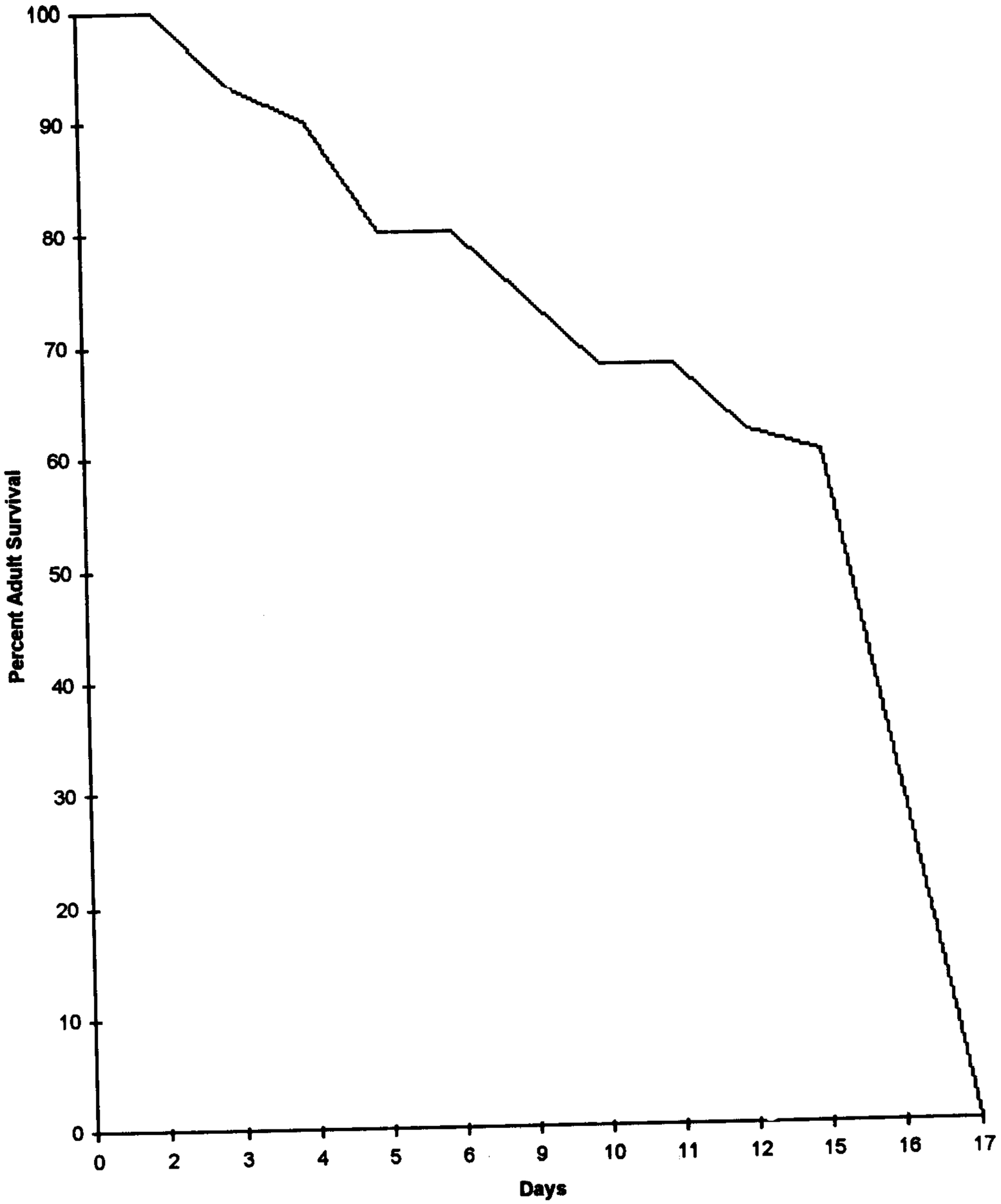

Figure- 5: Average Number of Nymphs Produced per Female Per Day by *Macrosiphum Avenae* (F.) in the Laboratory.

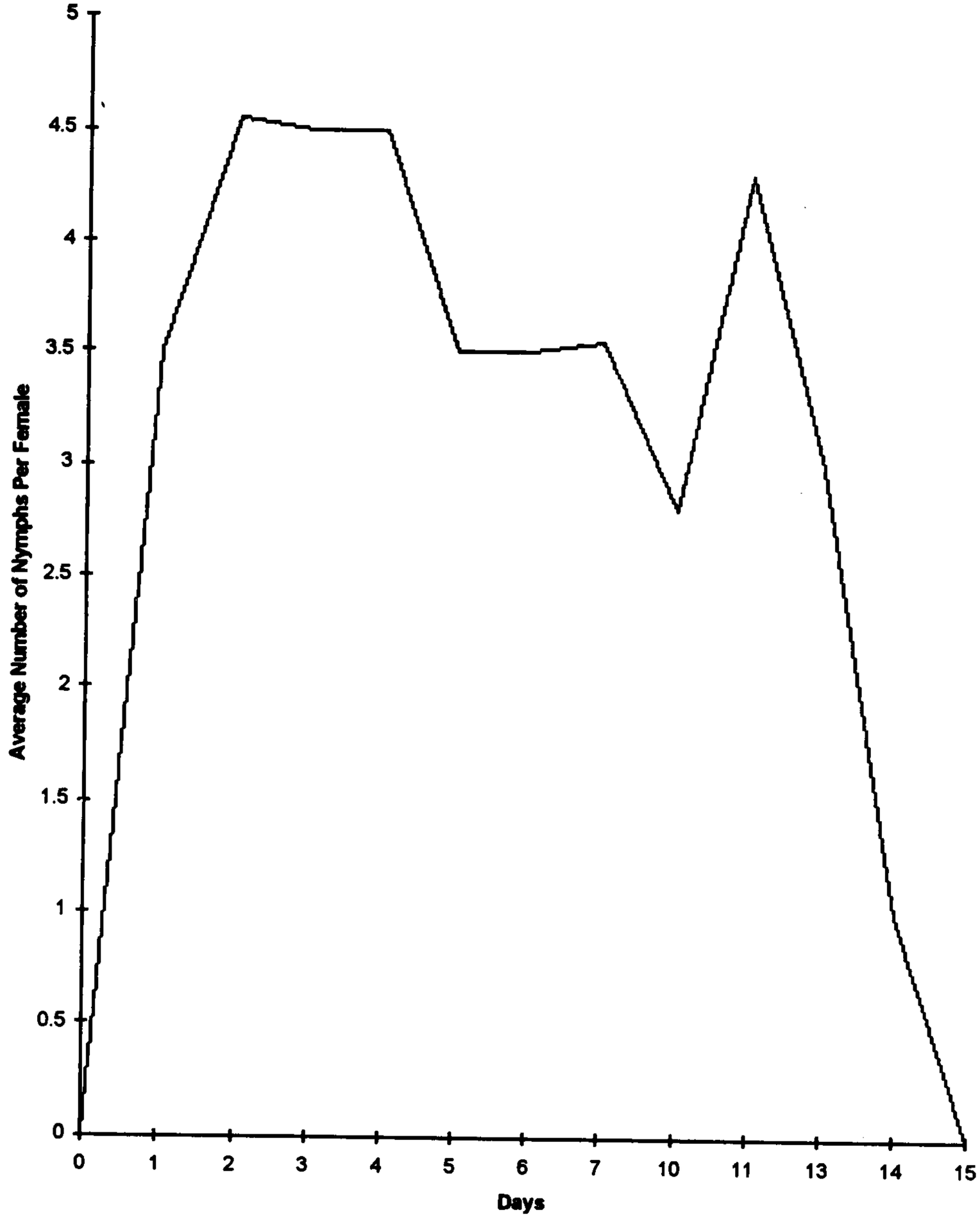

Figure-6: Longevity of Adult Apteerous Females of *Macrosiphum Avenae*(E) in the Laboratory Expressed in Terms of Percent Survival Per Day.

Table-2 indicates that the duration of reproductive period of *Macrosiphum avenae* varied from 11 to 14 days with an average of 13 days. Similarly and apterous adult female aphid was found producing 37 to 57 nymphs in her life of 25 to 30 days. The greatest number of nymphs borned in one day per aphid was observed to be six and the lowest number was observed to be one. The rate of reproduction of this species per day ranged from 3.08 to 5.53, with an average of 3.80.

Average duration of life of this species of aphid after the reproductive period was found to be 2.94 days ranging from 2 to 4 days. Thus adult longevity varied from 15 to 17 days with an average of 15.94 days.

The maximum speed of developmental, survival, fecundity and longevity of *Macroiphum* avenue on wheat plant to its greater susceptibility attacks.

Thus, present study indicates that the wheat aphid *Macrosiphum* avenue due to its high rate of multiplication in spring season is capable of causing heavy losses to the Commercial wheat varieties in Nepal.

CONCLUSIONS

Biology of wheat aphid *Macrosiphum avenae* (Fabricius) was studied under laboratory conditions of the Central Department of Zoology at Kirtipur.

Average development period, duration of reproductive period, fecundity, rate of reproduction, adult longevity of *Macrosiphum avenae* were observed to be about 11, 13, 48,4 and 16 days respectively. Total percentage survival of Macrosiphum avenae during developmental period was found to be about 67%.

Thus it is obvious from the present study that the prereproductive and post-reproductive periods of *Macrosiphum avenae* were more or less the same. Wheat plants are thus suitable hosts for aphid species *Macrosiphum avenae.*

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