

Bionomics of poultry louse *Lipeurus lawrensis tropicalis* Peters (Phthiraptera : Ischnocera)

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ABSTRACT

The bionomics of *Lipeurus lawrensis tropicalis* Peters, an ischnoceran Phthiraptera has been recorded by *in vitro* studies. The incubation period of eggs and duration of different nymphal instars has been worked out at different temperatures. The adult longevity, daily average egg rate and total egg production at different relative humidities has also been studied.

Key words : Bionomics of poultry louse, incubation period, nymphal instars.

INTRODUCTION

Some information regarding the longevity and fecundity of few phthirapteran species is available. Certain aspects of biology of two amblycerans, *Menacanthus stramineus* (infesting poultry bird) and *Ricinus elongatus* (infesting Blackbird) have been studied by Stockdale and Raun (1965) and Baum (1968) respectively. Among the ischnocerans, *Columbicola columbae* (infesting pigeons), *Lipeurus heterographus*, *L. caponis*, *L. tropicalis* (all infesting poultry) and *Falcolipeurus frater* (infesting white scavenger vultures) have been studied by Martin (1934), Wilson (1934 and 1939), Arora and Chopra (1957 and 1959) and Agarwal (1967). Agarwal (1959) has studied two more ischnocerans, *Aegypocerus perspicus* and *Upupicola upupae* from this point of view (unpublished). Williams (1970) has performed *in vitro* studies upon *Goniodes colchici* (infesting pheasants). Workers like Blagoveshtchensky (1959), Eichler (1963) and Marshall (1981) have reviewed the work of this field. Further Agarwal and Saxena (1982 a) have provided information regarding the effect of temperature on the oviposition in *Lipeurus lawrensis tropicalis* while Agarwal and Saxena (1982 b) and Saxena and Agarwal (1982) have studied the effects of temper-

ature on the development as well as hatching of the eggs of above said louse. Further studies on its biology have been made during last few years. In the present paper an attempt has been made to ascertain the effect of different temperatures on the incubation period and duration of different nymphal instars of *L. lawrensis tropicalis*. Further, the effect of different humidities on life span, total egg production and average egg rate of this ischnoceran louse infesting poultry birds has also been studied.

MATERIAL AND METHODS

The birds infested with *L. lawrensis tropicalis* were purchased from Dehradun and brought to laboratory. The feathers containing egg of lice were taken out and examined. Fresh looking eggs were selected for study. At least 30 eggs were incubated at 30, 32, 35, 38 and 40°C in incubators/B.O.D. incubator at 75-83% R.H. After the hatching, first instar nymphs were further reared individually, following the *in vitro* rearing method discussed by Saxena et al. (1983). The experiments were performed in batches. The freshly emerged adults were further reared in separate pairs. At least 10 adult males and females were reared at 45, 55, 75, 83 and 92% R.H. at $35 \pm 1^\circ\text{C}$. The R.H. was controlled by using saturated solutions of salts (Winston and Bates, 1960). The stock was examined daily and the mortality, and number of eggs laid recorded. Fresh feathers were provided regularly for food and oviposition.

OBSERVATIONS

The incubation period of eggs of *L. lawrensis tropicalis* ranges from 4-8 days. The average incubation period has been found to be minimum (4.2 days) at 40°C. As many as 70% eggs hatched at this temperature. However, highest percentage of hatching (80%) took place at 35°C, followed by 38°C, (73.3%). As many as 70% eggs hatched at 32°C but the average incubation period extended to 5.8 days. Maximum value of mean incubation period (7 days) for 30 eggs was recorded at 30°C. The hatching percentage was lowest at this temperature (Fig. 1).

The range of duration of first nymphal instar has been found to be 4-8 days. The average duration was minimum at 40°C but the mortality was quite high as 46.6% nymph could survive, (Fig. 1). The survival was maximum (73.3%) at 35°C followed by 38°C (70%). The average duration at these temperatures has been found to be 5.5 days. The longest duration of first instar nymphs has been recorded at 30°C when it took an average 7.3 days but the survival remained 30%.

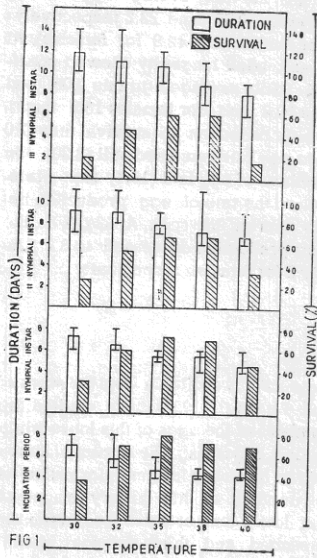


FIG. 1

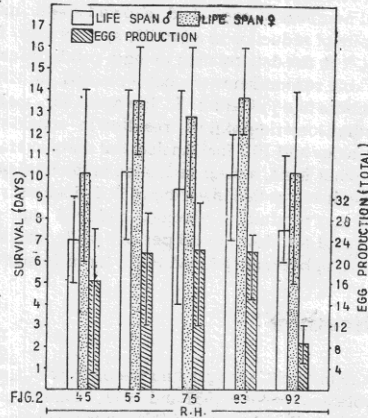


FIG. 2

FIG. 1. EFFECT OF DIFFERENT TEMPERATURES ON THE DEVELOPMENT OF *LIPEURUS LAWRENSIS TROPICALIS*.

FIG. 2. ADULT SURVIVAL AND EGG PRODUCTION OF *LIPEURUS LAWRENSIS TROPICALIS* AT DIFFERENT R.H.

Nearly similar results have been obtained for second instar nymphs. The duration of second nymphal instar ranges from 6-11 days. Maximum survival could be recorded at 35 and 38°C (66%) when the average duration of nymphal instars has been found to be 7.9 and 7.2 respectively. The duration remained minimum (6.7 days) at 40°C but only 33.3% lice survived. Longest duration has been recorded at 30°C (9.1 days).

The pattern of results remained nearly similar for third instar nymphs. The range of duration varied from 6-11 days (Fig. 1). The longest duration has been recorded at 30°C (average 11.8 days) but only 20% nymphs could reach this stage. Similarly, only 16.6% nymphs survived at 40°C but the average duration of nymphal instar has been found to be 10.6 and 8.8 respectively.

The daily average egg rate and total numbers of eggs laid has been found to be 2.07 and 21.6 respectively (Fig. 2) while mean survival time for male and female lice

was 10.1 and 13.7 days respectively. At 75% R.H. the daily average egg rate and total numbers of eggs laid showed slight increase 2.25 and 22.2 respectively; inspite of reduction in adult life span (9.4 day for males and 12.8 for females). At 55% R.H. the data relating to egg productions and adult longevity showed considerable resemblance to that obtained at 83% (daily average egg rate 2.05, total numbers of eggs laid 21.7, life span for males 10.2 and for females 13.5 days). Further lowering of R.H. resulted in considerable reduction in survival time (7.0 for males and 10.1 for females) but daily average egg rate remained still (2.20). On the other hand, a clear reduction in the total numbers of egg laid (16.4) took place. Thus, it seems that lowering of R.H. does not retard the rate of egg production but total egg production becomes reduced due to shorter life span. At 92% R.H., the egg rate fell down to 1.3 per day while total egg production decreased to 8.2. The life span became reduced to 7.5 for male and 10.2 for females respectively.

DISCUSSION

Some information regarding the biology of *L. tropicalis* is available from the work of Arora and Chopra (1957 and 1959). Saxena and Agarwal (1982) have studied the effect of temperature and R.H. on the morphogenesis of the eggs of this louse while Agarwal and Saxena (1983 b) provided information regarding the impact of above said factors on hatching of the eggs. Present report furnishes further information of on the effect of temperature and R.H. on the duration of life history stages of *L. lawrensis tropicalis*. It has been found that at lower temperatures the duration of (i.e. incubation period, duration of first, second and third nymphal instars) becomes extended. On the other hand, slight increase in temperature reduces the time required for the completion of stages. However, such a reduction in duration of stage is generally coupled with increased mortality.

Agarwal and Saxena (1980 a) have provided information about the effect of different temperatures on oviposition in *L. lawrensis tropicalis*. They stated that the lowering of temperature results in reduction of oviposition rate and also the total numbers of eggs laid whereas a rise in temperature above the optimal level increases oviposition rate coupled with reduction in total numbers of egg laid. Present studies relating effect of different R.H. upon the oviposition of this louse indicate that the lower humidities hardly affect the oviposition. The daily average egg rate remained above 1.9 from 45 to 83% R.H. The reduction in total numbers of eggs laid is mainly due to reduced life span. On the other hand, R.H. above 83% adversely effect the process as both daily average egg rate and total numbers of egg laid become reduced, alongwith adult survival.

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