

# Seasonal Prevalance And Intensities of Four Species of Phthirapteran on Blue Rock Pigeon At Meerut Uttar Pradesh

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## Abstract

Lice population on avian host ranges from nil to thousand per host. prevalence and intensities of lice population on blue rock pigeon were observed throughout the year 2017 in Meerut region Uttar Pradesh. Four species of lice such as *Columbicola columbae*, *Companulotes bidentatus compar*, *Colpocephalum turbinatum* and *Hohorstiella lata* were found, inhabit the exterior surface of blue rock pigeon. We assumed a hypothesis that four species of phthiraptera inhabit the pigeon body show similar result in prevalence and . To tested this hypothesis, we examined adult male ,female and nymph of all four phthirapteran species every month of the year . the obtained result show that avian lice exhibit variation in population abundance and prevalence in different season of the year in spite of the fact that they live in a microclimate of considerable constancy (offered by the plumage of the host). The prevalence of four kinds of lice on the 360 pigeons describe that *C.columbae* was the most prevalent louse on the pigeons, followed by *C. turbinatum* and *C. bidentatus compar*. The amblyceran louse *H.lata* remained the least prevalent pigeon louse. Furthermore, the result show the mean monthly prevalence of first three pigeon lice were significantly correlated to mean monthly temperature and photoperiod but not to humidity. However mean monthly prevalence of *H.lata* were not found significantly correlated to the three ecofactors mentioned above.

**Keywords:** *Columbicola columbae*, *Companulotus bidentatus compare*, *Colpocephalum turbinatum*, *Hohorstiella lata*.

## Introduction

Phthirapteran ectoparasites do not only affect the vitality and productivity of their host but often act as a reservoir and transmitter of pathogens among their host. Avian lice spent their entire life cycle (egg to egg) on their host body where they feed on feathers, dermal debris and blood. The anatomical , physiological, morphological and behavioral adaptations of avian lice are suited for the ectoparasitism. The closeness between lice and their host is strikingly illustrated by them as their environment is made up of the microclimate provided by the host. Out of the nine phthirapterans known to infest the blue rock pigeon *Columbia livia*, Gmelin , only four species (two ischnocera- *Columbicola columbae*, *Companulotes bidentatus compar*, two amblycera *Colpocephalum turbinatum* and *Hohorstiella lata*) were encounter on 360 pigeons. The occurrence of remaining five species (such as *Bonomiella columbae*, *Coloceras aegypticum*, *Coloceras damicorni*, *Coloceras israelensis*, *Physconelloides zenauidurae* )was not noted. *Columbicola* is one of the most dominant genera of avian lice generally

infest pigeons and doves. All the species of the genus is long and slender in shape and insert themselves between the barbs of large flight feathers of wings and tail of host. The small sized, slow moving *C. bidentatus* compar lice mainly occur on fluffy zone on the ventral side of body feathers. *Colpocephalum turbinatum*, a small very active louse shelter inside calamus of primary and secondary feather. *Hohorstiella lata* is very fast running amblyceran louse which occurs on any part of the body of infested pigeon.

Marshall (1981) has emphasized that the population dynamics of avian lice should be described with the help of two parameters (a) prevalence (the percentage of infested host) (b) infestation rate (the mean number of parasites per examined host). Several factors affect the population levels of phthiraptera. Apart from environmental factors (temperature, photoperiod, humidity, rainfall etc), some host factors (moulting, nesting activity, grooming and transference of lice after the hatch) affect the population level. The impact of phthirapteran parasitism depend upon their feeding habits and population abundance. Study of four pigeon lice indicate that the *C. columbae* and *C. bidentatus* compar are feather feeder species. *Colpocephalum turbinatum* also appeared to non haematophagous in nature. adults of *H. lata* appeared to more haematophagous than nymphal instars. Previous studies describe that avian lice generally peak in summer while the mammalian lice exhibits maximum in winter. We investigate the seasonal variations in the population of four species of lice found on *Columba livia* by mean monthly prevalence and mean monthly intensities were computed statistically.

### Material and methods

To test the hypothesis, thirty live pigeons were deloused every month (2017) by modifying the technique suggested by Harshbarger and Raffensperger (1959). However, the chloroform was used instead of methyl bromide. The pigeon was placed in a plastic bag along with a large ball of cotton wool soaked with chloroform (in such a way, the head of the pigeon protruded out). after 10-12 minute, the pigeon was taken out from plastic bag and the feathers were manually fluffed to allow the lice to fall straight on smooth white paper sheet. More than 80 % of the lice were recovered within 10 minutes.

After delousing, each feather as well as skin was thoroughly searched for the presence of lice under a Magnascope. The head of the pigeon was specifically searched for the presence of lice. The lice still adhering to feather and skin were manually taken out with the help of wetted camel hair brush.

The obtained louse load transferred to 70 % alcohol in a cavity block. On a later day, the louse load of each pigeon was separated species wise, stage wise and sex wise under the stereozoom trinocular microscope. The data obtained in this manner used to record the prevalence, mean intensities, sample mean abundances of four pigeon lice. To record the population composition of four pigeon lice, the mean number of each stage (adult male, female and nymphal instars), male female ratio, adult nymph ratio and the ratio of three nymphal instars was determined monthly. To observe the seasonal variation in the prevalence and intensities, mean monthly prevalence and mean monthly infestation intensity were statistically computed.

## Result

Out of the 360 *Columba livia* examined during different months of the year 2017 in district Meerut, 77% were found infested (fig.1) with one or the other species of phthiraptera (mean intensity of infestation - 105.43 per pigeon, sample mean abundance - 82.0 per pigeon). The range of infestation varied from 3 to 631. Sixteen percent pigeons carried single species of phthiraptera. Two species infestation occur on 28 % infested pigeon (fig.2). 41% pigeons infested with three species of louse. Simultaneous occurrence of all four species was observed on 15 % infested pigeons. In other words, three species infestation was most common and four species infestation remained least common on pigeons of district Meerut.

### *Seasonal prevalence and intensities of phthirapteran species on Columba livia.*

*Columbicola columbae* : The prevalence remained minimum (60.0%) in January & February 2017 and gradually rose to (76% ) in July to September then returned to lower level (60%) in December. Similarly, mean intensity of infestation remained minimum (33.3 per pigeon) in January but gradually rose to (71.9 per pigeon) in July, decreased (56.2 per pigeon) in August but reached maximum (100.4) in September. Thereafter it decreased and reached (40.6 per pigeon) in December.

*Companulotus bidentatus* compare : The mean monthly prevalence remained lowest (40%) in January 2017 and gradually rose to (56%) in April. then show little decline and again attend the same level in August and September. Thereafter it started decreasing and reached to minimum level (40%) in December. Mean monthly intensities also remained lowest (20.8) in January and continuously rose to reach maximum level (48.0 per pigeon) in July. Then decreased and reach near lowest level (20.9) in December.

*Colpocephalum turbinatum* : Mean monthly prevalence remain 50% in January 2017, then slightly increase (56.6%) reported in March thereafter a decline (46.6%) occur in April and rose to highest level (66.6%) in July and August. Thereafter it decline and reach to 50 % level in December. Mean monthly infestation remained (30.6) in January and gradually rose to 60.7 level in April then show an abrupt decrease (40.0) in May and reached at maximum level (48.0) in July. thereafter it gradually decrease (30.6) in December.

*Hohorstiella lata* : Mean monthly prevalence remain minimum (10.0%) in January 2017 then rose to (26.0%) in March then observed slightly decrease (20.0%) in April. thereafter rose to maximum level (30%) In May and June then it gradually decrease (20.0%) in succeeding months. The mean monthly intensity remained (18.0) in January then reduced (4.1) in February, again rose (8.0) in March and slightly increase (9.6) observed in April. Then reach to maximum level in (14.0) in July. Thereafter it gradually decrease (4.0) and attained minimum level in succeeding months.

Months	Species			
	Columbicola columba	Comanulotas bidentatus compar	Colocephalum turbinatum	Hohorstiella lata
	M:F A:N I:II:III	M:F A:N I:II:III	M:F A:N I:II:III	M:F A:N I:II:III
<b>Jan</b>	1:1.3 1:0.71:1.5:1.5	1:1.5 1:1 1:1.3:1.6	1:1.2 1:0.6 1:1.3:1.7	1:0.4 1:0.8 1:1.4:2.4
<b>Feb</b>	1:1.2 1:0.8 1:1.3:1.6	1:1.3 1:0.7 1:1.1:1.1	1:2 1:0.7 1:1.6:2.3	1:1.8 1:0.7 0:6:5
<b>Mar</b>	1:1.3 1:0.8 1:1.3:1.8	1:1.6 1:1.1 1:1.4:1.2	1:1.3 1:0.9 1:1.1:1.3	1:1.6 1:1 1:1.7:1.9
<b>Apr</b>	1:1.2 1:1.3 1:1:1	1:1.2 1:1.2 1:1.1:1.2	1:1.2 1:1.1 1:1:1.2	1:1.2 1:1:1 1:1.1:1.7
<b>May</b>	1:1.3 1:1.2 1:1.2:1.4	1:1.3 1:1.4 1:1.1:1.3	1:1.4 1:1.5 1:1.2:1.3	1:1.7 1:1.5 1:1.8:2.0
<b>Jun</b>	1:1.2 1:1.4 1:1.1:1.2	1:1.3 1:1.4 1:1.2:1.5	1:1.6 1:1.3 1:1.3:1.5	1:1.7 1:1.3 1:1.3:1.6
<b>July</b>	1:1.3 1:1.4 1:1.4:1.5	1:1.4 1:1.2 1:1.1:1.1	1:1.7 1:1.5 1:0.8:1.2	1:1.5 1:1.6 1:1.1:1
<b>Aug</b>	1:1.2 1:1.1 1:1.1:1.1	1:1.6 1:1.2 1:1.1:1.1	1:1.4 1:1.3 1:1.1:1.3	1:1.7 1:1.3 1:1.1:1.7
<b>Sep</b>	1:1.3 1:1.2 1:1.1:1.4	1:1.6 1:1.2 1:1.2:1.5	1:1.5 1:1.2 1:1.2:1.1	1:1.8 1:1.8 1:1.2:1.5
<b>Oct</b>	1:1.3 1:1.1 1:1.2:1.5	1:1.6 1:1.1 1:1.1:2.0	1:1.5 1:1.2 1:1.1:1.3	1:3.2 1:1.2 1:2.2:3.5
<b>Nov</b>	1:1.4 1:1.2 1:1.4:1.6	1:1.7 1:1.1 1:1.3:1.5	1:1.4 1:1.1 1:1.2:1.5	1:2 1:0.6 1:3:5
<b>Dec</b>	1:1.4 1:1.1 1:1.2:1.7	1:1.8 1:1.2 1:1.2:1.8	1:1.8 1:1.2 1:1.2:1.5	1:1.8 1:0.7 0:6:4
<b>overall</b>	1:1.3 1:1.2 1:1.4:1.4	1:1.6 1:1.2 1:1.2:1.4	1:1.5 1:1.2 1:1.1:1.4	1:1.6 1:1.2 1:1.5:1.9

Table 1. showing population composition of four pigeon lice during different months of the year 2017 in district Meerut of U.P.

### Conclusion

The population level of phthirapteran ectoparasite on the Columba livia of Meerut region was quite high (prevalence -77.7%, mean intensity of infestation – 105.43 per pigeon, sample mean abundance – 82.0 per pigeon, n=360). The ischnoceran louse, Columbicola columbae was prevalent (prevalence- 70.0%, mean intensity of infestation- 58.5 per pigeon, sample mean abundance- 40.9 per pigeon, range of infestation 1-200, n=360), followed by amblyceran louse, Colpocephalum turbinatum ( prevalence- 56.1 %, mean intensity of infestation- 40.9 per pigeon, sample mean abundance- 22.9 per pigeon, range of infestation 1-380, n=360) and then ischnoceran species, Companulotes bidentatus compar (prevalence- 48.6 %, mean intensity of infestation- 48.6 per pigeon, sample mean abundance- 16.1 per pigeon, range

of infestation 1-19, n=360). The amblyceran louse, *Hohorstiella lata* was least prevalent on the pigeons in Meerut region (prevalence- 22.8%, mean intensity of infestation- 10.3 per pigeon, sample mean abundance-2.3 per pigeon, range of infestation 1-35, n=360).

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