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Dr. Sanjay Kumar Singh
Assistant Professor,
Department of Zoology,
Ganjdundwar PG College,
Ganjdundwara (Kasganj),
Uttar Pradesh, India

Dr. Manish Kumar Sonker
Assistant Professor,
Department of Zoology,
Government Girls PG College,
Ghazipur, Uttar Pradesh,
India

Dr. Balbir Singh
Assistant Professor,
Department of Zoology, Pandit
Deen Dayal Upadhyay,
Government Degree College
Saidpur Ghazipur, Uttar
Pradesh, India

Corresponding Author:
Dr. Sanjay Kumar Singh
Assistant Professor,
Department of Zoology,
Ganjdundwar PG College,
Ganjdundwara (Kasganj),
Uttar Pradesh, India

Incidence and Intensity of infestation by *Columbicola columbae*, *Colpocephalum turbinatum*, *Companulotes bidentatus compare* and *Hohorstiella lata* (Phthirapterans) on pigeons of Jaunpur District of Uttar Pradesh

Sanjay Kumar Singh, Manish Kumar Sonker and Balbir Singh

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Abstract

The present was carried out to document information incidence and intensity of infestation by *Columbicola columbae*, *Colpocephalum turbinatum*, *Companulotes bidentatus compar* and *Hohorstiella lata* are varies according to seasonal variation. Prevalence and intensity of infestation of phthirapterans lice reported higher in summer (June & July) and lowest in winter (December). Incidence and intensity of infestation of above phthirapterans lice are also depend upon feather condition, hygienic condition, age and breed of pigeon.

Keywords: Phthireptera, Pigeon louse, *Columbicola Columbae*, *Colpocephalum turbinatum*, *Companulotes bidentatus compare* and *Hohorstiella lata*. Prevalence and intensity of infestation

Introduction

Information on the prevalence and intensity of infestation of different phthirapteran ectoparasites on certain avian host viz. sparrows (Hoyle 1938) ^[12] starlings (Boyd 1951) ^[21], blackbirds, orange crowned warblers (Foster 1969), auks (Eveleigh & Threlfall, 1976) ^[7] procellariiform birds (Fowler *et al.*, 1984) ^[15], wood ducks, Wilson's petrels and storm petrels (Fowler & Price 1987) ^[22], manx shear waters (Fowler & Shaw 1989) ^[16], five shore bird species (Hunter & Colwell, 1994) ^[19], Flea (Galloway TD 2018) fly catchers (Potti & Merino 1995) ^[20], bee eaters, has become available.

Only a few workers have examined birds belonging to different orders from this point of view (Ash 1960, Brown (1970) has made attempt to study the prevalence rate of four phthirapteran species infesting Pigeons of Boston (U.S.A.). Rekasi *et al*, 1997 ^[17] and Rozsa 1997 ^[17] have discussed the pattern in abundance of avian lice.

The prevalence rate of phthirapteran ectoparasites on Indian birds is not well documented (Chandra *et al*, 1990 ^[38], Trivedi *et al* (1992) ^[10] recorded the prevalence and intensity of phthiraptera on poultry birds of deharadun. Prevalence of poultry shaft louse, Menopongallinae on poultry birds on Garhwal was noted by Saxena *et al.* (2004) have noted the different phthirapteran species of henes of Rampur. Present studies deals with the prevalence and intensity of infestation of four phthirapteran species *Columbicola columbae* & *Colpocephalum turbinatum* on pigeons of Jaunpur district (Uttar Pradesh) during the year 2004.

Material and Methods

Twelve locality of Jaunpur district (Table 1) were surveyed to record the prevalence and intensity of infestation of four pigeon lice (eg. *Columbicola columbae*, *Colpocephalum turbinatum*, *companulotes bidentatus compare* and *Hohorstiella lata*) during January 2004 to December 2004. The examined hosts (*Columba livia*) were domestic as well as wild.

Worker (Creighton *et al* 1947) ^[1] have adopted different coding system for recording the intensity of lice while studying the economic effects of parasitism and eradication measures. In the present study the coding system of Harshbarger & Raffensperger (1961) ^[3] was adopted along with some modification of Derylo (1974) ^[4]. During the Present studies prevalence and infestation rate was recorded by timed visual counts as the birds belonged to the private owners/birds keepers. The surveyor had to record the prevalence and intensity of lice infestation without causing any harm to the birds. Hence, the birds legs were tied with rubber band/thread and both the wings, were held by the assistant (in upright position). Bird's feathers were deflected manually and the presence of lice was observed with the help of magnifying torch. Lice were taken out and placed in vials containing 70% alcohol. Each infested bird was again subjected to 5 minutes observation (for each species) to record the number of lice by coding system (1-25 lice VL, 26-50 lice L, 51-75 lice M, 76-100 lice H, and > 100 lice VH)

Observation

A total of 1200 pigeons examined during January 2004 to December 2004 in twelve localities of Jaunpur district, 76% were found infested with one or other species of phiraptera (Table 1). Prevalence rate of *C. columbae* was highest (73.2%) followed by *C. turbinatum* (68.7%) *C. bidentatus compar* (57.8), while *H. Lata* exhibited low rate of prevalence (38.6%), (Figure 1).

Out of 1200 pigeons examined, 513 were males and 687 females. Prevalence rate of three species e.g., *C. columbae* (70.6 and 75.1%), *C. turbinatum* (66.6 and 70%) and *C. bidentatuscompar* (56.7 and 58.5%) remained more or less similar on two sexes of the host (fig.2). However, prevalence rate of *H. lata* was marginally lower on male birds in contrast to females (34.1 and 41.3%). Thus host sex exerted nil to lesser effect on prevalence rate of different phthirapteran species (Figure 2).

An attempt has been made to record the general health (physical condition) of examined host under one of three heads(good, normal and poor). The categorization was solely arbitrary (first glance impression).At least 20.8% pigeons were apparently in good condition, while 44.4% appeared normal in health and 34.5% place in poor category. The prevalence rate of *C. columbae*, *C. turbinatum*, *C. bidentatus compare* and *H. lata* remained higher on poor birds (89.1, 88.2, 65.9 and 42.3% respectively) in comparison to healthier ones (47, 52.6, 43.8 and 36.5%, respectively) (Figure 2).

In order to observe the impact of crowding on incidence rate, the mode of captivity of examined birds, were also noted. Only 6.4% pigeons were found reared singly, 23.8% in groups of 2-5 and 69.8% in bigger groups (more than 6). Bigger groups were found more prevalent (*C. Columbae*-78.6%, *C. bidentatus compar* 65.4%, *C. turbinatum*-71.4% and *H. lata*-41.3%) in comparison to singly reared (40.3, 35.1, 37.7 and 24.7%, respectively) (Figure 2).

Feather condition of examined birds has also been taken in consideration by placing them into one of the three categories (good, normal and poor). Those birds having considerably damaged/ruffled feathers (may be due to continuous preening by host, to get rid of lice) were placed in 'poor' category. Prevalence rate of *C. columbae*, *C. turbinatum*, *C. bidentatus compare* and *H. lata* was

distinctly higher on 'poor plumage' category (80.8, 72.2, 63.5 and 42.6%) in contrast to 'good plumage' category (94.6, 58.9, 40.2 and 19.6%, respectively), (Figure 2).

Attempt has been made to record the impact of host feather colour on incidence rate of phthiraptera. As many as 33.1% pigeons had white feathers, 52.5% gray and rest 14.4% placed in other colour (mixed type) category. Prevalence rate of *C. columbae* on the three groups remained nearly similar (72.2 to 74.3%) (Figure 3), *C. bidentatus compare* (57.2 to 57.9%) and *C. turbinatum* (67.1 to 70.1%) also exhibited similar prevalence rate on all the three groups. Prevalence of was considerably higher on mix type category (45.1%) in comparison to other two categories (36.8 and 37.3%), (Figure 3).

About 57% pigeons were found domestic breed while 43% wild. Three lice species *C. bidentatus compar* *C.* (54.5% and 62.1%), *C. turbinatum* (65.5% and 72.7%) and *H. lata* (31.3% and 47.4%) exhibited considerable variation in prevalence rate between domestic and wild breed while *C. columbae* noted similar (73.1% and 73.3%) in both the category (Figure 3).

The hygienic conditions (around the area of maintenance) has noted by placing the infested pigeons in of the three categories-good, average and poor. The incidence rate of all the four species (*C. columbae*, *C. bidentatus compare*, *C. turbinatum* and *H. lata*) exhibits higher infestation in poor category (82.6%, 64.8%, 78.6% and 41.7% respectively) in comparison to good hygienic condition (40.7%, 33.7%, 34.5% and 15.9% respectively), (Figure 3).

The impact of age on the prevalence of pigeon lice were recorded by placing the host in one of the following categories-1-6, 7-12, 13-18 and above 19 months in age. Maximum incidence occurred in aged (above 19 months) birds (*C. columbae*-80.6%, *C. bidentatus compare*-78.5%, *C. turbinatum*-75.5% and *H. lata*-60.8%) in contrast to younger (1-6 months) birds (62.1%, 25.3%, 54% and 30.5% respectively) (fig.3).

As far as intensity of infestation of *C. columbae* is concerned, maximum percentage of infested birds (41.2%) bore medium infestation, followed by light (17.2%) and high infestation category (15.8%). Nearly similar percentage of birds exhibited very light infestation (15.4%). State of very heavy infestation was noted on 10.4% infested birds (Figure 4).

The intensity of infestation of *C. turbinatum* on infested pigeon remained more or less similar to *C. columbae*. Percentage of birds carrying very light, light, medium, heavy and very heavy infestation remained 15.4, 18.9, 38, 15.9 and 11.8% respectively (Figure 4).

Maximum percentage of pigeons infested with *C. bidentatus compar* carried in light infestation (36.2%), followed by very light (24.7%) and medium infestation category (21.2%). Thus, more than 80% pigeons had under very light to medium infestation. Very heavy infestation was recorded only 8.5% pigeons (Figure 4).

Most of the pigeon infested with *H. lata* bore very light infestation (47.3%). Light and medium infestation was noted on 16.1 and 22.4% birds respectively. Percentage of pigeons with heavy and very heavy infestation of *H. lata* remained quite lower (8.9 and 5.2% respectively), (Figure 4). An attempt has also been made to derive information mean monthly incidence of different species, from the data. All the species exhibited nearly similar trend of seasonal population fluctuation during different months of the year

2004 (Figure 5). In case of *C. columbae* minimum incidence was noted in January 2004 (52.7%). It gradually builds up during succeeding four months reaching maximum (96.6%) in June 2004. Thereafter, it started decreasing gradually and reached lowest level (53.2%) in December 2004 (Figure 5). In case of *C. turbinatum*, the incidence was 48.4% in January 2004. It continued rising till June 2004 (96.6%), but exhibited gradual decline thereafter and become lowest in December.

Likewise, *C. bidentatus compar* exhibited lowest incidence in December 2004 (33.9%). It was 36.3% in January 2004, which increase till June 2004 (87.9%). It started declining thereafter during succeeding six months, reaching 45.9% in November 2004 (Figure 5).

In case of *H. lata*, lowest incidence was noted in January 2004 (14.3%). It continued rising till June 2004 (71.6%) but reduced from July 2004 to December 2004 (59.5% to 17.4%, respectively) (Figure 5). Thus, the above said result indicates about the lice population and seasonal atmosphere.

Discussion

The degree of harmfulness of different phthirapterans species of pigeons (in term of loss of weight, vitality and productivity of host birds) is quite variable. *M. stramineus* (reported by Brown, 1970) [11] was not found upon the pigeons of Jaunpur district, but prevalence of other haematophagus lice (*C. turbinatum* and *H. lata*) were found considerable higher in this area. Earlier, Brown (1970) [11] gave some indication about the incidence rate of different ectoparasite on pigeons belong to Boston in U.S.A. and in Uttaranchal respectively. Four phthirapterans species (e.g. *C. columbae*, *C. bidentatus compar*, *H. lata*, *C. turbinatum* recorded along their prevalence rate as 49.7, 45.7, 1.4, and 0.02% respectively) has been reported from U.S.A. The occurrence of *Menacanthus stramineus* on the pigeons of Jaunpur has not been noted during present studies. However, another amblyceran, *C. turbinatum* occurred very frequently and ranked second in the order of prevalence rate (*C. columbae*-73.2% > *C. turbinatum*-68.7% > *C. bidentatus compare*-57.8% > *H. lata*-38.3%). Out of these four species, *C. columbae* and *C. bidentatus compare* are feather feeding, sluggish Ischnocera while other two are amblycerans. *C. turbinatuma* non-heamatophagous, feather deeding species cannibalism (Nelson, 1971) [5] While *H. lata* is an active exclusively heamatophagous (consumes host blood in addition to feather derivatives) species. Obviously, this

species must be potentially most harmful (with respect to health and productivity of host birds). Incidentally, the prevalence rate of this louse on pigeons of Jaunpur has been found to be the lowest (as compared to other three lice species).

The impact of host sex, weight and age (on the incidence of avian lice) has been noted occasionally by few workers (Eveleigh & Threlfall, 1976; Potti & Merino, 1995) [7, 20]. In case of domestic ungulates incidence rate of phthirapteran species has been reported to higher on females. However, in case of avian phthiraptera, authors have provided conflicting reports on the subject (Ash, 1960) [14]. During present studies sex related difference in the prevalence rate of different species remained more or less negligible.

Poor health of host found more prevalent than the birds having good and normal health. It may be due to the sluggish nature of the host during unhealthy condition. Singly reared birds exhibited comparatively lower incidence than those maintained in groups (2-5 or more than 6).

As per expectation the pigeons with poor plumage exhibited higher prevalence rate of (in case of all four species) than other two categories. Although, it is difficult to ascertain whether the pigeons having poor plumage are more prone to lice infestation or heavy infestation results in greater destruction of feathers as lousy hosts perform frequent preening and are also engaged in the body, in order to get rid of lice, Saxena *et al.* (1995) [8] also found higher incidence of *M. gallinae* on poultry with poor plumage.

Saxena *et al.* (1995) [8] did not find any impact of host feather colour on the prevalence rate of *M. gallinae*. Slight differences in prevalence rate of different species recorded during present studies with respect to feather colours of pigeons may be circumstantial and evidently the feather colour appears to have nil to negligible effect.

The prevalence rate of phthirapterans were found equal in domestic as well as wild breed pigeons. The impact of host age on prevalence rate of lice appears to be quite evident. In the present study the incidence rate gradually increased with age and remained about 1.5 time higher in older birds (above 19 months) than the younger ones (1-6 month in age). The actual cause behind these finding is difficult to ascertain at present and need more investigation. In accordance with the general belief, the neatly maintained bird showed lesser prevalence than poorly or normally maintained host.

Table 1: Locality-Wise prevalence rate of pigeon lice in Jaunpur district during January 2004 to December 2004

Sr.No.	Locality	Observed	Infestation(%)
1	Chakkey	97	73 (75.3%)
2	Jalalpur	96	81 (84.4%)
3	Kerakat	102	77 (75.5%)
4	Line Bazar Jaunpur	107	81 (75.7%)
5	Mariahu	108	76 (70.4%)
6	Matapur	100	78 (78.0%)
7	Shakar Mandi	98	77 (78.6%)
8	Shahganj	91	70 (76.9%)
9	Thanagaddi	116	79 (68.1%)
10	TrilochanMahadev	89	72 (80.9%)
11	Vazidpur Farm	93	77 (82.8%)
12	Zafarabad	103	79 (76.7%)
	Total	1200	920(76.7%)

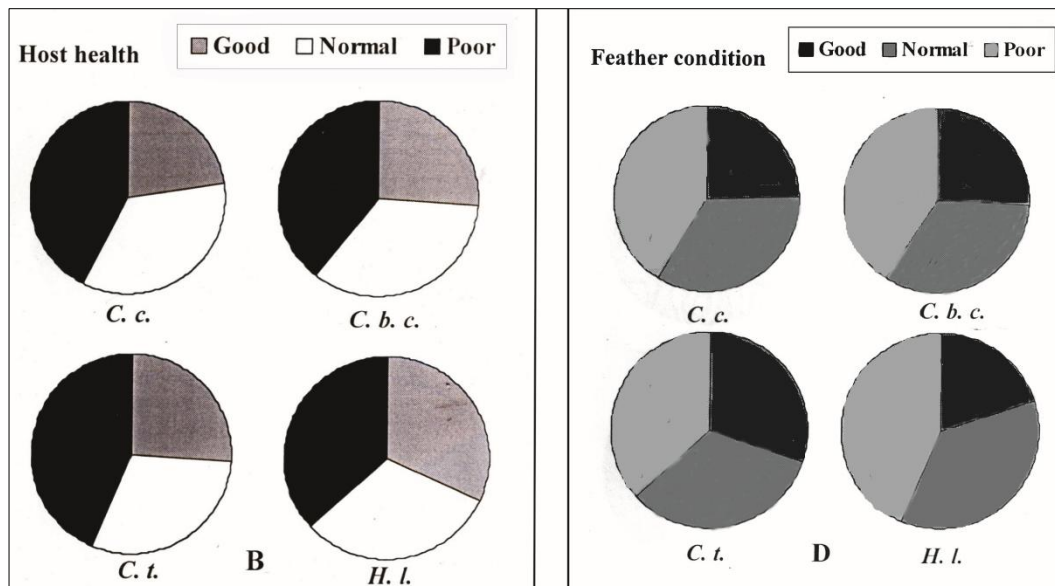


Fig 1: A-D: Showing impact of certain factors on incidence of four pigeon phthiraptera in the year 2004 (*C.C*-*Columbicola columbae*; *C. B.C*-*Campanulotes bidentatus compar*; *C.T*-*Colpocephalum turbinatum*; *H.L*-*Hohorstiella lata*)

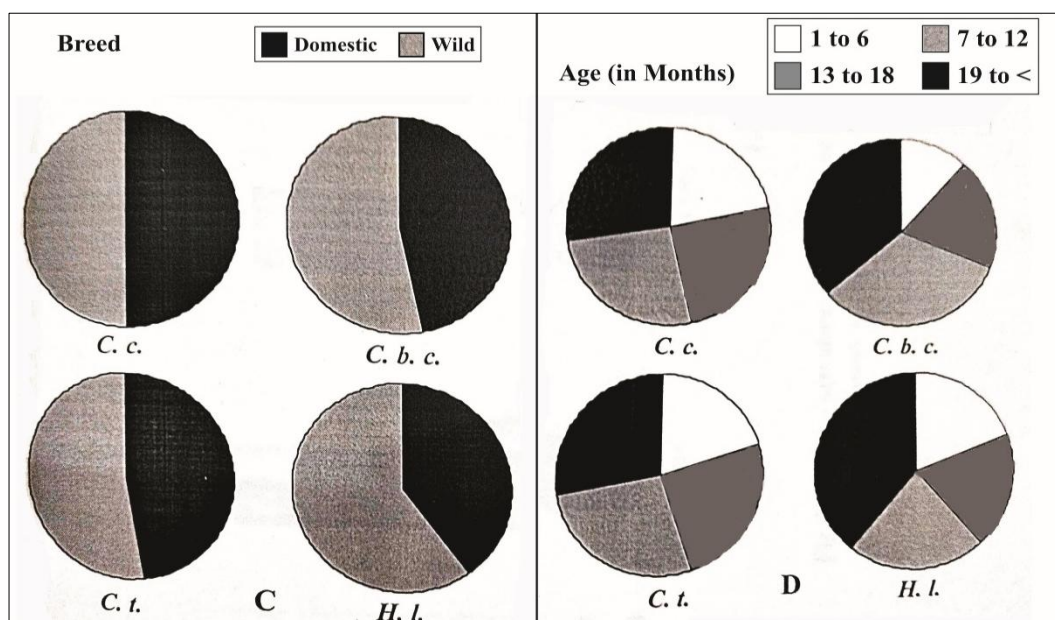


Fig 3: A-D: Showing impact of certain factors on incidence of four pigeon Phthiraptera in the year 2004 (*C.C*-*Columbicola columbae*; *C. B.C*-*Campanulotes bidentatus compar*; *C.T*-*Colpocephalum turbinatum*; *H.L*-*Hohorstiella lata*)

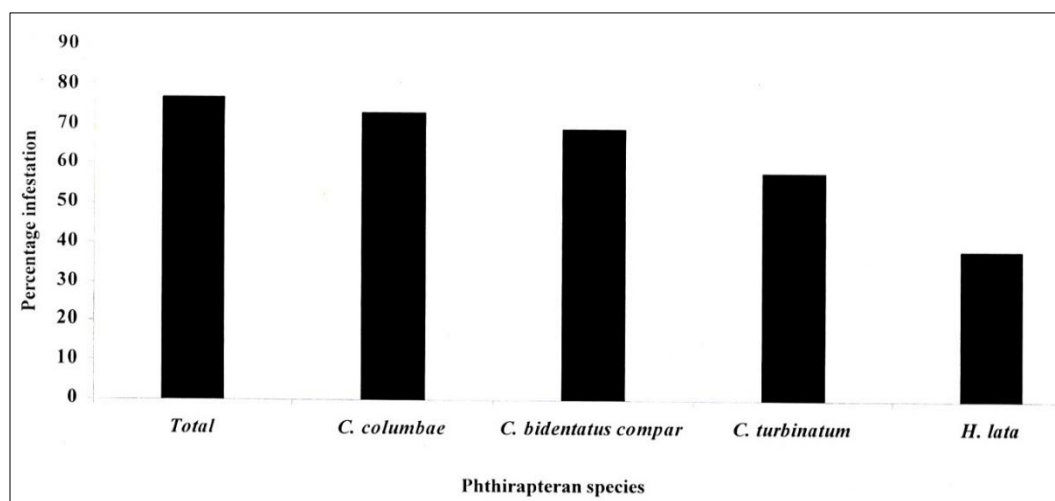


Fig 4: Displays the prevalence rate of different phthirapteran species (lice) infesting pigeons in Jaunpur district during January to December 2004.

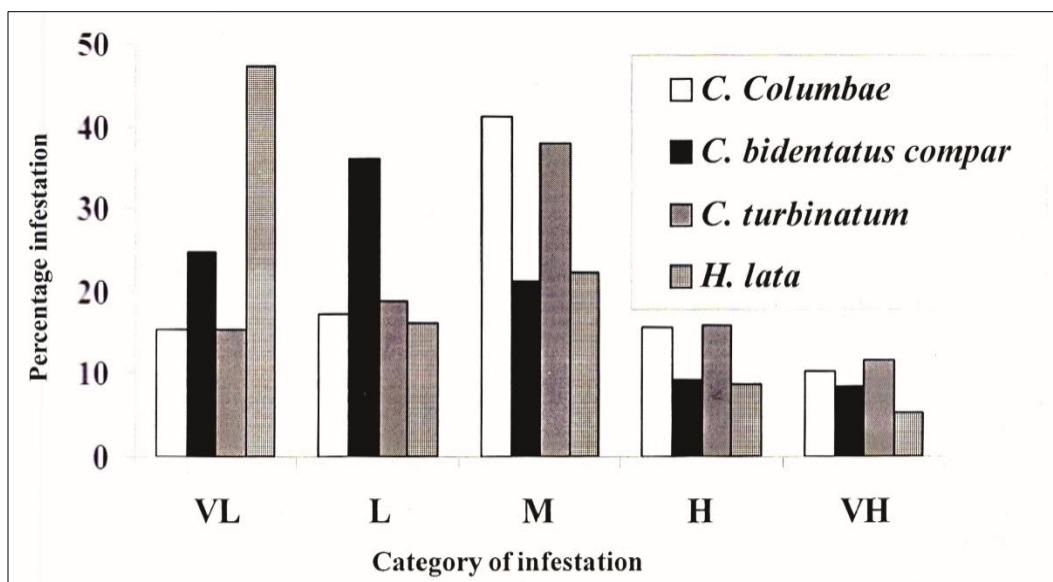


Fig 5: Presents the intensity of infestation by four phthirapteran lice species on pigeons from Jaunpur during 2004. The infestation categories are: VL (Very Light), L (Light), M (Moderate), H (Heavy), and VH (Very Heavy).

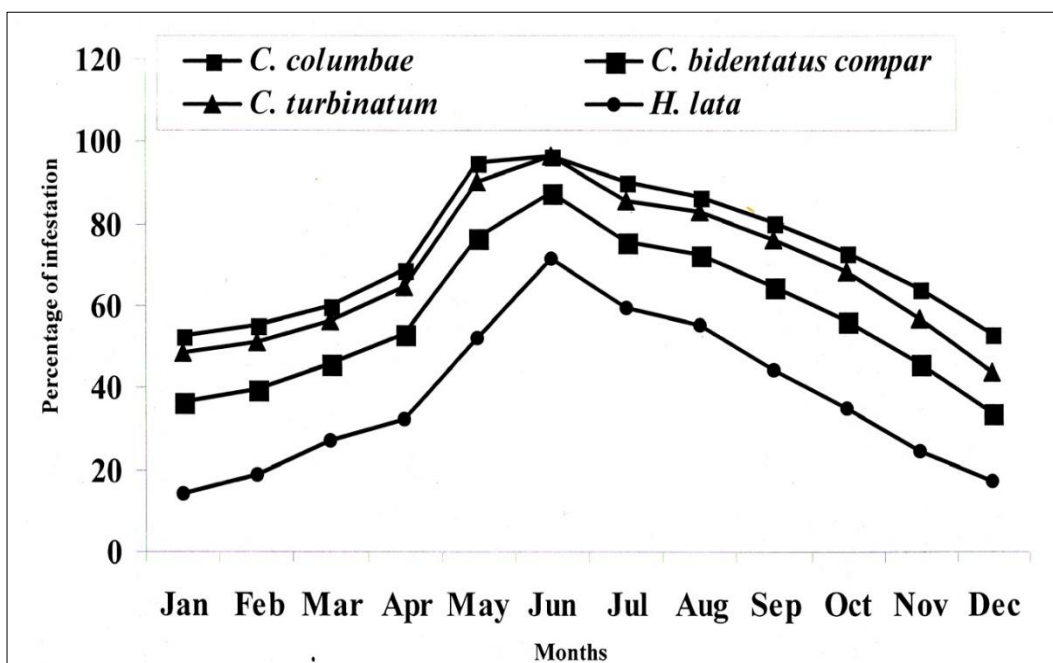


Fig 6: Illustrates the monthly incidence of four phthirapteran species (*C. columbae*, *C. bidentatus compar*, *C. turbinatum*, and *H. lata*) on pigeons in Jaunpur during 2004.

During present studies prevalence rate remained higher during the month of Jun. Avian lice generally peak in summers (Eveleigh & Threlfall, 1976 and Saxena *et al*, 1995) [7, 38, 21]. Apart from environmental factors (temperature, relative humidity, photoperiod, rainfall etc.). Many biological factors (moulting, grooming, preening, nestling, breeding, deformities etc.) reportedly influence louse population. However, factors responsible for fluctuation in incidence rate can only be demonstrated by conducting experiment under extremely controlled condition (after harbouring statistically adequate number of pigeons). The intensity of infestation exhibited normal distribution pattern in case of *C. columbae* and *C. turbinatum*. However in case of *H. lata* and also *C. bidentatus compar* most of infested hosts (more than 80%) bore very high, light and moderate infestation. On the other hand, percentage of very

heavily and heavily infested host remained considerably lower.

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