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SHORT COMMUNICATION

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A survey of phthirapteran ectoparasites on the Grey Francolin, *Francolinus Pondicerianus* (Galliformes: phasianidae) in North-India

S. K. Singh • Surman Arya • Sandeep Kumar • Vikram Khan

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Abstract As many as 144 brown francolin (*Francolinus pondicerianus*) were netted from 6 sites of Uttarakhand during the period from October, 2006 to September, 2008, to note the occurrence of phthirapteran species. Out of 144 birds, 45.83% were found to be infested with two species of lice i.e. *Menacanthus kalatitar* and *Goniocotes jirufi*, the former species occurring in 29.17% of birds (mean intensity 11.45 and sample mean abundance 3.34) whereas the later infesting only 25.69% of birds (mean intensity 8.22 and sample mean abundance 2.11). Significant positive correlation existed between mean monthly lice index and mean monthly temperature as well as photoperiod, while negative correlation was seen with respect to relative humidity and rainfall.

Keywords Grey Francolin, Phthiraptera, Mallophaga, Ischnocera, Amblycera

Significant work has been done on the aspect of economic importance, ecology, pathogenesis and prevalence of phthirapteran ectoparasites infesting different birds and mammals. Workers like, Hoyle (1938); Boyd (1951); Derylo (1974); Marshall (1981); Price and Graham (1997); Hoi et al. (1998); Rozsa et al. (2000); Clayton and Drown (2001); Wall and Shearer (2001) and Price et al. (2003) have made important contributions on the subject. Indian workers like, Trivedi et al. (1992); Saxena et al. (1995, 2004); Gupta et al. (2007); Khan et al. (2007, 2009) and Singh et al. (2009) have provided information on occurrence of some avian lice. In case of partridge, only few workers (Aksin 2003; Millan et al. 2004) have recorded the population parameters of phthirapteran ectoparasites. Available literature reveals that there is no work on the occurrence of phthirapterans on grey francolin (*Francolinus pondicerianus*, Gmelin, 1789) in this area. Present work provides information about phthirapteran infestation on *F. pondicerianus* occurring in Uttarakhand.

S. K. Singh[1] ✉ • S. Arya[2] • S. Kumar[2] • V. Khan[3]
[1]Department of Biotechnology,
Modern Institute of Technology,
Dhalwala, Rishikesh - 249 201,
Uttarakhand, India
[2]Dept. of Zoology, Govt. P.G. College,
Gopeshwar (Chamoli), Uttarakhand, India
[3]Dept. of Zoology, Govt. Raza P.G. College,
Rampur - 244 901 (U.P.), India
e-mail: drsuneelkumarsingh@yahoomail.com,
drsuneelkumarsingh@gmail.com

Material and methods

One hundred forty-four (*F. pondicerianus*) were netted alive from different parts of Uttarakhand. After tying the legs, each bird was thoroughly searched for the presence of lice by visual examination. Infested birds were then deloused by fumigation method used by Clay and Drown (2001); Saxena et al. (2004) and Khan et al. (2007, 2009). Head and body feathers were further examined using a stereozoom trinocular microscope to remove the remaining lice. The lice so obtained were subjected to maceration (10% KOH), dehydration (ethanol series), clearing (clove oil/xylene) and then mount in Canada Balsam/DPX, for taxonomic

categorization. Deloused birds were released in wild to lead a healthier life. The entire louse load was placed in 70% alcohol and separated according to species, age and sex wise.

All collected lice (including nymphal stages) were washed with distilled water to remove the fixative. The washed specimens were kept in 10% KOH until their bodies became transparent. Then they were washed to remove the alkali. After washing, the lice were dehydrated through a graded series of alcohol i.e. 30, 50, 70, 90 & 100% for 10–15 minutes. Following dehydration, the specimens were cleared in xylene and mounted in Canada balsam. The mounted species were identified according to the keys given by Price et al. 2003. An attempt has also been made to find out the degree of correlation between mean monthly lice index of the period October 2006 to September 2009 and the mean monthly temperature, photoperiod, relative humidity and rainfall.

Result

Six sites (Rishikesh, Kotdwara, New Tehri, Uttarkashi, Srinagar and Gopeshwar) of Uttarakhand, were surveyed to note the occurrence of phthirapteran ectoparasite on grey francolin, *F. pondicerianus,* during October 2006 to September 2008. The world checklist of Price et al. (2003) has reported single louse species (*Menopon interpositum*) from grey francolin. In present investigation, 45.83 % (n = 144) grey Francolin were found infested with two phthirapteran species, an amblyceran (*Menacanthus Kalatitar* Ansari 1951) and other ischnoceran species (*Goniocotes jirufi* Ansari 1951).

M. kalatitar was the most prevalent louse species (29.17 %, n = 42) A total of 481 specimens (all stages) were collected from infested birds (mean intensity = 11.45; sample mean abundance = 3.34; range 7–28, n = 42). The male female ratio remained 1:1.11 and adult nymph ratio was 1: 0.87. The ratio of three nymphal instars was 1: 0.69:0.38 (Table 1). The prevalence of *G. jirufi* on *F. pondicerianus* remained (25.69 %, n = 37). A total of 304 specimens were recovered (all stages) (mean intensity = 8.22; sample mean abundance = 2.11; range= 5–17, n = 37). The male female ratio remained 1: 1.34 and adult nymph ratio 1: 0.85. The ratio of three nymphal instars was 1:0.69:0.39 (Table 1).

Mean monthly lice index were correlated with mean monthly temperature, photoperiod, relative humidity and rainfall, by applying simple correlation method. Maximum lice index were found during summer while lowest remained in winter. Significant positive correlation existed between mean monthly prevalence and mean monthly temperature as well as photoperiod (r = 0.83 and 0.79, respectively). However, correlation with mean monthly relative humidity (r = –0.31) and rainfall (r = –0.11) remained insignificant, at 0.05 level of significance.

Discussion

Phthiraptera not only affect the vitality and productivity of their hosts but also act as reservoirs and transmitter of pathogens causing fowl cholera, typhoid and toxoplasmosis

Table 1 Occurrence of lice species on *Francolin*

Parameters	Lice species occurring on *Francolin*	
	Menacanthus kalatitar	*Goniocotes jirufi*
Infestation	29.17%	25.69%
Mean intensity	11.45%	8.22%
Sample mean abundance	3.34	2.11
Adult : Nymph	1 : 0.87	1 : 0.85
♂ : ♀	1 : 1.11	1 : 1.34
♂ : Nymph	1 : 1.84	1 : 2.0
♀ : Nymph	1 : 1.66	1 : 1.49
I-N:II-N:III-N	1 : 0.69 : 0.38	1 : 0.64 : 0.39
Range	7 – 28	5 –17

(Derylo 1974). Chewing lice (Phthiraptera: Amblycera, Ischnocera) may cause irritation of the skin, restlessness, overall weakening, cessation of feeding, loss of weight, inferior laying capacity, and skin lesions that may become sites of secondary infection (Wall and Shearer 2001). The most pathogenic forms belong to the genus *Menacanthus* (also recorded from *F. pondicerianus*). They may cause anaemia, heavy multi-focal skin lesions or even death of infested birds (Prelezov et al. 2006). In present study *M. kalatitar* was found most prevalent (29.17%) on grey francolin. Chewing lice living on feathers, such as ischnocerans, although causing damage to feathers, affect their hosts much less than do amblycerans. The Ischnoceran louse *Goniocotes* (also present on *F. pondicerianus*) less damaging than other poultry lice (Price and Graham 1997). Ischnoceran louse species *G. jirufi* was found less prevalent (25.69%) on francolin during the present study. As far as sex ratio is concerned, there was considerable uniformity as the females outnumbered the males in case of both the species. In phthirapteran population, sex ratios are generally female biased (Marshall 1981). Avian lice generally peak in summers (Boyd 1951; Marshall 1981; Saxena et al. 2004; Singh et al. 2009). More or less similar results were obtained during present study. However, there is a lot of controversy regarding the factors responsible for summer peak of avian lice. Apart from environmental factors, many biological factors reportedly participate in determining the seasonal incidence of lice. It seems that temperature and photoperiod plays a dominant role in the incidence of lice on host body. Strong positive correlation was recorded between mean monthly lice index and mean monthly temperature and photoperiod.

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