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RESEARCH ARTICLE

Breeding habitat preference of black francolin *Francolinus francolinus asiae* in chamoli district of Uttarakhand, Western Himalaya

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Abstract

Study on selection of breeding habitat is important for conservation of black francolin. During present study, four sites had been selected and encounter rate were observed in M I (7.75±0.25), M II (9.35±0.35), G I (6.4±0.40) and G II (8.2±0.30). The abundance of black francolin found more in marginal areas of crop fields (4.7±0.28), then crop fields (2.26±0.47) and very low in forest (0.87±0.62). The average diameter of nest (21.95±0.8 cm) and depth (7.7±0.38 cm) were found. The average clutch size was recorded 6.5±0.5 in the present study area. Selection of nest sites and encounter rate suggest that during breeding period black francolin prefers perennial grass and shrub cover along with cultivation field in high altitude area of Uttarakhand.

INTRODUCTION

Black francolin *Francolinus francolinus asiae*, one of the most famous game bird of order Galliformes, and distributed widely from Kashmir to West bengal along with the foothills of central Nepal, Punjab, U.P., Bihar, and thence through M.P. to the chilka lake in Odisha (Ali and Ripley, 1983; Bump and Bump, 1964). It is well adapted for different ecological zone of India and lives in thicker vegetation cover, cultivated crop fields and grassland area (Ali and Ripley, 1983; Heidari et al., 2009; Khan and Mian, 2012).

Although this species has been considered globally least concern (IUCN, 2007), but in some parts of its distribution habitat destruction, poaching and hunting pressures are the common threats for Black francolin (Roberts, 1991; Heidari et al., 2009). For conservation management of bird, habitat and their ecology are very important aspects because bird density increase with increasing suitability of habitat (Cody, 1985). Black francolin is one of the common birds of Uttarakhand. Despite of this fact, no relevant information is available regarding to its breeding ecology. This study gain insights into breeding habitat preferences of black francolin in chamoli district of Uttarakhand.

Materials and Methods:

Study Area: Uttarakhand lies between 28^{o}44' to 31^{o}28' N Latitudes and 77^{o}35' to 81^{o}01 E Longitudes. The state represents the Bio Geographical Zones (2B) of Western Himalaya. The present study was conducted in chamoli district (30° 27.560' N latitude, 79° 15.234' E longitude) situated in north western part of Uttarakhand (Figure 1). In chamoli four sites were selected i) Mandal I(MI), ii) Mandal II(MII), iii) Gopeshwer I(GI), iv) Gopeshwer II(GII). The average maximum and minimum temperature ranges between 31^{0}C-2.9^{0} respectively. It comprises wide altitudinal range, climatic condition and topography, which support rich biodiversity of Galliformes.

Sampling Design: In the study area, four sites had been selected. The Abundance of black francolin was estimated by line transect (Buranham et. Al, 1980; Kreb, 1989; Javed and Kaul, 2000) and trail walk (Ramesh et al., 1999)

methods. On each site, one transect or trail was laid for three consecutive days to monitor the abundance. Total 36 transect/trail were laid during study.

Data collection: Data were collected for three consecutive days in every site, both in the morning (6:00 to 9:30 am) and evening (16:00 to 18:30pm) during breeding period between March to August from 2012 to 2013. During encounter, sighting angle, site distance, gender, number of birds, time & GPS location recorded. Along the transect/trail, nesting pattern of black francolin was also studied.

Data analysis: Encounter rate were used for calculating relative abundance of black francolin. Two year data were pooled from all transect and trail walk to calculate mean encounter rate± standard error (SE) for each site. For breeding habitat preference, abundance data of black francolin categorize into, (i) crop field, (ii) margin area of crop fields and (iii) forest area.

Results:

Abundance: Encounter rate of black francolin in different sites were observed, M I (7.75±0.25), M II (9.35±0.35), G I (6.4±0.40) and G II(8.2±0.30) respectively (Table 1). Figure 2 shows that black francolin abundance more in crop field margin areas (4.7±0.28), then crop field (2.26±0.47) and very low in forest (0.87±0.62).

Nesting characteristics: The black francolin nests were found between 1300 -1700m asl altitude during study. Table 2 represent all four nests were situated in marginal area of agriculture field. The nests were found in shallow depression surround with grasses. The average diameter of nest (21.95±0.8 cm) and depth (7.7±0.38 cm) were found. Total six plant species associates with nest building, in which four grasses species e.g. *Imperata cylindrical, cyanodon dactylon*, *Heteropogon contortus* and *Poa species*, one undershrub *Ageratina adenophora* and one shrub *Rubus ellipticus.* Apart from this wheat debris and dry leaves were used for nest building. The average heights of grasses were 13.65±1.8 cm. The average clutch size (6.5±0.5) recorded in study area (Table 2). Eggs were oval shaped, lightly olive and white coloured (Figure 3).

Discussion: During breeding period, ground dwelling cursorial birds depend on the local conditions of the temperature, avoiding predation pressure and the availability of food (Hill and Robertson, 1988). The present study showed in breeding season more abundance in cultivated field edges where more grasses and shrubs cover present. This gives better protection and plenty of food resources. Previous studies in partridges also shows breeding density positively correlated with availability of cover of perennial herbs and shrubs (Panek Kamieinarz. 2000; Panek, 2002). Breeding calls starts from April-May in study area, which is generally depend on different parts of its range from March to August (Ali and Ripley, 1983).

All nests were situated in agriculture field's margin areas where thick grasses cover and grass tuft present under beneath of shrubs and these crop fields surrounded with chir pine forest and Himalayan temperate forest. All nest building associated with grasses, scraps and dead leaves and similar reports also observed in other black francolins subspecies e.g. *F.f. henrici* (Khan and Mian, 2012), *F.f. bogdanovi* (Heidari et al., 2009). The average nest distance from crop fields (13.62) proved that grasses and shrubs associate with shelter and cultivated filed use as open foraging ground. Similarly pheasant nest observed on the periphery of their feeding rang (Hill and Robertson, 1988). Previous study on grey partridges (*Perdix perdix*) also suggest that breeding success depends upon type of agricultural land and its surrounding vegetation cover (Panek Kamieinarz, 2000; Panek, 2002). The average clutch size was found 6-7, which is similar to 6-8 (Hume and Oates, 1890) and lower than 10-12 (Jerdon, 1863) reported earlier.

Abundance of black francolin during breeding season observed stable in study area and it is widely distributed in Uttarakhand. But illegal hunting and habitat destruction and their fragmentation observed main reason of its population declining in some area of Himalayan region. Present investigation on breeding habitat preference allows the management plan for conservation of the species and its habitat area and provides the baseline data for further research wor

Table 1. Encounter rate of black francolin *Francolinus francolinus asiae* in study Area

Sampling Sites	Transect /Trail walk length(km)	Altitude (m)	Encounter rate
M I	2	1320-1450	7.75±0.25
M II	2	1340-1500	9.35±0.35
G I	2	1500-1640	6.4±0.56
G II	2	1550-1690	8.2±0.42

Table 2. Nesting characteristics of black francolin *Francolinus francolinus asiae* in study area

Nest site	Clutch size	Nest distance from crop field (m)	Nest diameter (cm)	Nest depth (cm)	Location
A	7	7	22	6.5	Field Edge
B	6	12	21.8	7.3	Field Edge
C	6	20	24	6.8	Field Edge
D	7	15.5	20	8	Field Edge
Mean±SE	(6.5±0.5)	(13.62±2.7)	(21.95±0.8)	(7.3±0.3)	

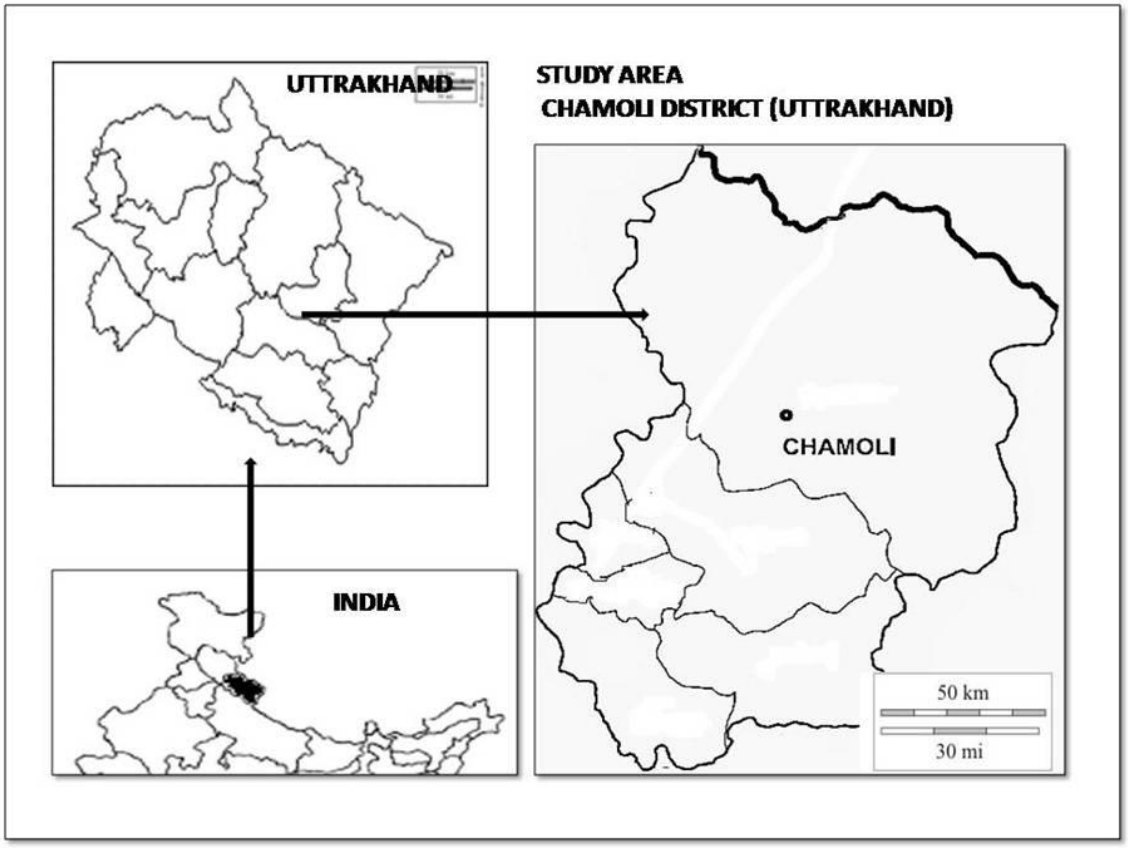

Figure 1. Study Area of black francolin *Francolinus francolinus asiae* in Uttarakhand

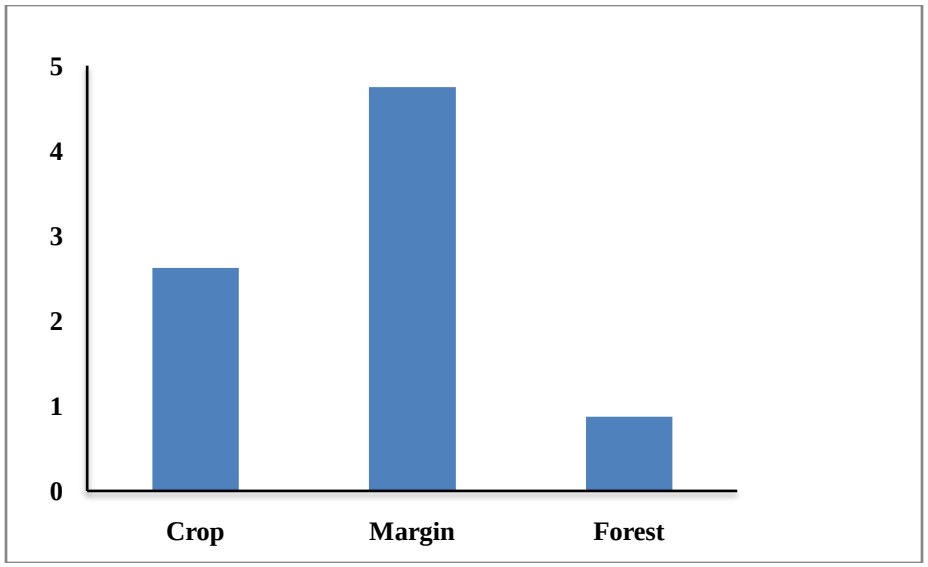

Figure 2: Encounter rate of black francolin *Francolinus francolinus asiae* in three different region i) crop field, ii) crop field margin area and iii) forest area

Figure 3. A nest of black francolin *Francolinus francolinus asiae* containing six eggs in field edges of agricultural land

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