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The Breeding Biology with Respect to Ecology of the Chiffchaff *Phylloscopus collybita* in Chhajjian, Haripur. Kpk, Pakistan

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Abstract

Chiffchaff belongs to the nominate race *collybita* and inhabits mainly deciduous or mixed woodlands. This study documents aspect of breeding biology of chiffchaff *Phylloscopus collybita* in Chhajjian, Haripur. KPK, Pakistan. We investigated the parameters such as: (1) laying dates; (2) length of the breeding season; (3) nest site usage; (4) clutch size; (5) length of the nestling period; and (6) the relative importance of causes of nest failure. First clutches are laid in the second half of April, and early May, with second clutches in June. Nests are built close to the ground, usually in Bramble Bushes Average clutch size decreases from 6 to 4 eggs through the season. Incubation and nestling periods last 13-14 days. Nest losses are mainly due to predation, which accounted for approximately 60% of losses in both data sets from five different localities. This is the first-ever documentation on chiffchaff from Pakistan so it will help the further finding to researcher and also for the conservation of then.

Keywords: Chhajjian; Breeding biology; Chiffchaff

Introduction

The leaf warbler's insectivorous birds which are adapted to *Phylloscopus spp.* are small foraging by leaf gleaning. The leaf warbler's Belongs to the family of the Old World warblers (*Sylviidae*), sub-order songbirds (*Oscines*), order passerines (*Passeriformes*) [1]. "*Phylloscopus collybita* complex" taxonomy was discussed by P Clement et al. [2]. The taxonomic relations between abietinus and tristis are not well understood. The molecular divergence between abietinus and tristis (1.7%-2.0%) is not sufficient to confirm their status as separate species [3]. Three species commonly breed in the British Isles as summer visitors, namely the Chiffchaff *P. collybita*, the Wood Warbler *P. sibilatrix*, and the Willow Warbler *P. trochilus*. The Chiffchaff is the smallest of them (7-9 g) and its extensive range, from the Canary Islands to eastern Siberia, covers a wide diversity of habitats and many subspecies are recognized. The Chiffchaff belongs to the nominate race *collybita* and inhabits mainly deciduous or mixed woodlands. Despite being a very common species in Britain, most known aspects of its breeding biology come from studies carried out in Switzerland, Germany, and Poland. The species is insectivorous feed on eggs, flies, Insects, and larvae of butterflies and moths Common Chiffchaff is a migratory passerine bird winter in southern and Asia and North Africa (sighting has occurred in Seistan, Afghanistan, and Pakistan [4]. Common Chiffchaff *collybita* is a common winter migrant to [5] occurred in Maharashtra [6], Kedarnath, Uttarakhand [7] and Delhi [8]. It is essential for understanding the breeding parameters of a species to understand its ecology and biology this information is more important in case of poorly known or threatened [9]. Chiffchaff has a more complex intra-specific differentiation, with the status of some taxa still unresolved [4]. We chose for an intensive study found in abundant in my area The "chiffchaff" a small warbler, in a variety of habitats as it is relatively common, it prefers to breed in low areas above the ground. This behavior of that species favors the data collection. Birds are widely familiar as an attractive target of research on microevolutionary processes, and such studies have commonly been conducted in contact zones [10]. This paper investigates aspects of the breeding biology of Chiffchaffs obtained during a broader study on the territorial behavior of the chiffchaff in village Chhajjian. The aims of this work were to document: (1) the onset and duration of its breeding season; (2) nest site usage; (3) variation in clutch size through the season; (4) the duration of incubation and nestling stages; and (5) causes of nest loss.

Materials and Methods

Study area

The study was conducted in Chhajjian is a valley in Haripur District in Khyber Pakhtunkhwa province of Pakistan. It is located south East of the District Haripur at (33.88522°N 73.038054°E). It is surrounded by mountains; its mountains are covered with Pine trees and rich in wildlife. It is located far about 25 kilometers from the district Haripur, Rainfall is much higher than in most other parts of district Haripur. This study was conducted in five different localities in the village Chhajjian Pattian, Udhardh, Dairi, Dara and Chardhi showed in (Figure 1). These localities are rich with the vegetation and trees and are the low lands from the hills or at the bottom of hills the climate of this area is severe i.e. in summer up to 35°C and 0°C in winter in some winters snow fall occurs. The vegetation of the study area consists of *Pinus roxburgii*, *Platanus orientalis*, *Euphratica*, *Melia azedarach*, *Grevillea robusta*, *Eucalyptus camaldulensis*, *Ficus palmate*, *Broussonetica paperfera* and many other plants also found there yet not documented.

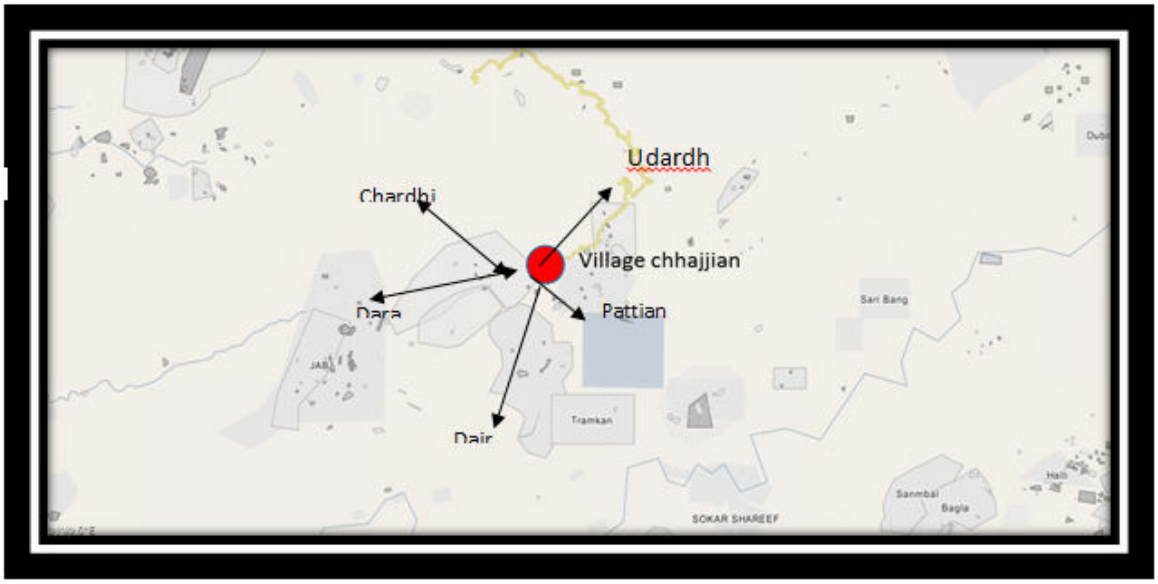

Figure 1: Map of village Chhajjian with localities.

Data collection

Field observations were carried out in village Chhajjian. The study design is covered mainly by areas of open woodland and vegetated area with mature trees. Data were collected during the duration of (January-December 2018). Covering the period of fieldwork from mid-March to the end of July. In total, total of 200 nest were recorded from all the localities Territorial birds were identified with 8 × 40 binoculars. By daily visits to territories, the onset of egg-laying and the breeding stages were determined. By observing female behavior Nests were located during nest building and by sampling the vegetation. Until the first egg was laid, they were checked daily, once nests were found by the three-day or five-day intervals. During the nest building or incubation stage Most of the nests were found (80%, N=50), and for analysis of clutch size only completed clutches were considered. After the eleventh or twelfth day at the approach of a predator Youngsters from Chiffchaff nests usually 'explode' (leave the nest quickly), after which some nestlings are able to survive. The following information was recorded for each nest: (a) site: plant species in which nest was built; (b) laying date; (c) clutch size; (d) duration of incubation and nestling periods; (e) success or failure; and (f) probable cause of failure.

Results

The common chiffchaff were found in abundance in village Chhajjian mostly these birds are found near the houses and near the fields foraging the leftover by the humans and also the crops in fields. Total five localities were selected in the present study there details with number of nest are given in (Table 1). The bird was a common migratory passerine bird and regular feeding. The adult has brown upperparts with olive green cast rump, wings and tails, and a whitish or buffish supercilium. Legs, less prominent supercilium. Juvenile is browner than the adult underpart showing in (Figure 2).

Breeding season

Egg Laying starts in the second half of April, in late April and early May at the peak, and decreases through June. New nests were rare in July (Figure 2). There was no significant difference in the frequency distribution of nests throughout the season between the data collected from all the five localities Pattian, Udhardh, Dairi, Dara and Chardhi sets. Highest percentages of nest were found in Pattian.

Localities	Total nest	Active nest	Inactive nest	Earliest	Latest
Pattian	19	20	9	16-Apr	26-Jun
Dara	16	14	3	18-Apr	27-Jul
Chardhi	20	12	10	17-Apr	02-Jul
Udardh	13	12	4	10-Apr	18-Jul
Dairy	27	18	9	16-Apr	04-Jul

Table 1: Total number of the nest observed in different localities for *Phylloscopus collybita*.

In Pattian Most of the first clutches were completed between the last week of April and the second week of May. Only 4 females started laying the first clutch after the fourth week of May because apparently they were late-arriving females. Laying ranging from the last week of May to the end of June was a second small peak corresponds with the production of second clutches (Figure 3). Of all nests, 30% were found after the last week of May in Pattian, after predation 15.3% being replaced 9.7% nests were confirmed as second clutches. No significant difference was found in other localities. We compare the two localities data set Dara and Pattian due to the highest eggs recording.

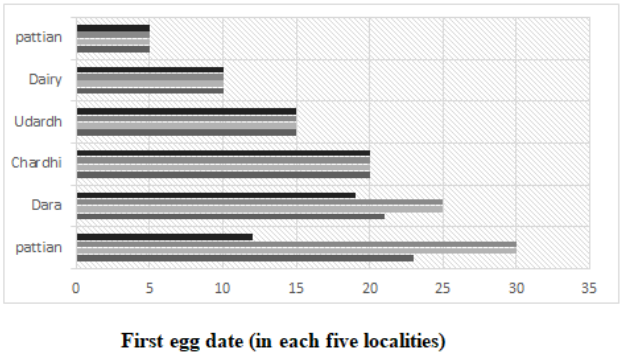

Figure 2: Proportion of nests started in each five-day period.

Nests in village Chhajjian were very well hidden in low bushes, invariably with decaying leaves in the external layer, from visually oriented predators probably providing concealment. As the main substrates for nests Chiffchaffs showed a preference for grass bramble or bushes (Table 2). Between all data set the frequency distribution of nests in the nest site height categories differed significantly (Figure 3). It was not possible to distinguish between nests of first and second broods but second brood nests in Pattian locality were significantly higher off the ground than those of first broods. The highest nest and nest highest was recorded in Pattian and lowest was found in Udardh showed in (Figure 3).

Plant substrate	Pattian	Dara	Chardhi	Dairy	Udhardh
Nettle (*Urtica dioica*)	40%	20%	12%	17%	20%
Gorse (*Ulex spp.)*	15%	12%	15%	13%	13%
Bracken	10%	6%	8%	5%	7%
Bramble (*Rubus spp.*)	14%	16%	15%	20%	8%
Grass	56%	50%	30%	48%	55%

Table 2: Distribution of nests in relation to vegetation.

Clutch size	Mean length (mm)	Mean breadth (mm)	Egg Weight (g)
1	17.8	15	2
2	18.5	15.5	2.3
3	19	17	2
4	18	16	2.7
5	19	17	2.3
6	18	26	3
3.5	18.38	17.75	2.38

Table 3: clutch size, mean length, mean breadth and egg weight of Egg of Chiffchaff.

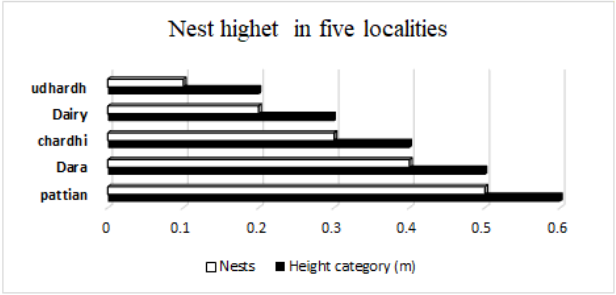

Figure 3: Proportion of nests highest in five localities.

Daily nest failure rates were also calculated in two different height classes for the five localities data set was found to be Nest failure rate were different inn five localities highest rate was 40 due to unhatched eggs during the nestling stage were significantly greater for higher nests (Table 3). Mainly due to predation were Causes of nest loss nesting losses showed in (Table 4). Desertion and other factors were of less importance for both data sets. Causes of failure reported in village Chhajjian in data were 'snake' 'jay', 'magpie', 'cat', 'squirrel', 'rat', and 'dog'. Corvids (20.4%) were the main predators 60 percent were destroyed by the predators. Other causes also accounts.

Causes of failures	Nestling failures (N)	Egg failures (N)
Unhatched eggs	-	40
Predation	7	60
Eggs destroyed accidently	-	6
Broken eggs found from nests	-	7
Bad location of nests	3	5
Mortality	5	-

Table 4: Causes of nestlings failures and egg of the *Phylloscopus collybita*.

Clutch size, incubation and nestling periods

The mean clutch size from Pattian was found with a mode of 5, and a range from two to nine eggs (Table 4). ANOVA showed no significant difference between the regions (0.2). Clutch size decreases through the season First clutches (median=5.0, N=41) were significantly larger than second clutches (median=4.0, N=21). As showed in (Figure 4) the clutch size is of the six eggs. Egg weight and other egg parameters have also measured the patterns of seasonal clutch size decline did not differ significantly between data sets. Incubation and nestling periods last 13-14 days.

Figure 4: showed the eggs of *Chiffchaff.*

Discussion

The winter distribution of birds in temperate latitudes depends, to a greater extent than at other seasons, on the optimization of meeting trophic requirements [11]. The exploitation of resources regulates habitat selection by birds and can vary according to environmental conditions and phenomena of inter-specific competition or intra-specific behavior [11]. Furthermore, the extent of migratory journeys is subject to the life strategies of the species, the latitude at which breeding grounds are located, selective pressures to return to the breeding areas as soon as possible, and the physical traits and experience (and related survival) of individuals [11,12]. Breeding grounds of *P. c. collybita* span from southern to central and Eastern Europe and also reach Sweden Iberian Peninsula [13]. Chiffchaffs complete their moult at their breeding grounds migrate mainly during March-April and August October [14]. Than autumn migration, spring migration is generally considered more time guarded because of numerous reproductive consequences that the timing of arrival at the breeding grounds may have for an individual [15]. Our results are in accord with the findings that these birds are frequently cited substrates were 'bushes' close similarities for (1) length of the breeding season; (2) laying dates; (3) nest site usage; (4) clutch size; (5) length of the nestling period; and (6) relative importance of different causes of nest failures. This suggests that, for the Chiffchaff. As reported earlier and in present study Nest building was an exclusively female duty. The plant substrate for a nest depends on the available vegetation, as from our finding and previous it is clear that Bramble bushes have an important role in the breeding of the Chiffchaff in no previous study has quantitatively documented the nest substrates used. It has been suggested that predation rates on Chiffchaff nests decrease as their height above ground increases. If higher nests were more easily found by such predators due to less vegetation cover than lower nests, then this might explain the significantly greater loss rate for higher nests [16]. After having the first clutch predated many females lay a replacement clutch. If a replacement is successful, it is unlikely that the birds will have sufficient time to attempt a genuine second brood because the birds need to allocate time and energy to moulting and laying down fat for migration. It has been shown that for many bird species clutch size decreases with laying date.

The seasonal decline is further shown by the difference in size between first and second clutches in village Chhajjian. However, predation was found to have the same relative importance as a cause of loss in both data sets. No data were found in Pakistan on the chiffchaff so it is the first document from Pakistan.

Conclusion

This paper investigates aspects of the breeding biology of Chiffchaffs obtained during a broader study on the territorial behavior of the species in village Chhajjian. the objective of this study was to document: (1) the onset and duration of its breeding season; (2) variation in clutch size through the season; (3) the duration of incubation and nestling stages; and (4) causes of nest loss. This is the first investigation from Pakistan about the beautiful chiffchaff birds so it will be leading documents for the researchers for further studies.

It is further suggested that Chiffchaff migration aspects should be studied in detail because it is a very important factor as Chiffchaff is suspected to be a carrier of Avian Influenza to the local population.

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References

1. Greenberg R, Pravosudov V, Sterling J, Kozlenko A, Kontorshchikov V (1999) Tits, warblers, and finches: foliage-gleaning birds of Nearctic and Palearctic boreal forests. Condor 101: 299-310.
2. Clement P, Helbig AJ, Small B (1998) Taxonomy and identification of chiffchaffs in the Western Palearctic. British Birds 91: 361-375.
3. Helbig AJ, Martens J, Seibold I, Henning F, Schottler B, et al. (1996) Phylogeny and species limits in the Palaearctic chiffchaff Phylloscopus collybita complex: mitochondrial genetic differentiation and bioacoustic evidence. IBIS 138: 650-666.
4. Shipilina D, Serbyn M, Ivanitskii V, Marova I, Backström N (2017) Patterns of genetic, phenotypic, and acoustic variation across a chiffchaff (Phylloscopus collybita abietinus/tristis) hybrid zone. Ecology and Evolution 7: 2169-2180.
5. Ganpule P (2016) The birds of Gujarat: Status and distribution. Flamingo 12: 1-40.
6. Chaudhari-Pachpande S, Pejaver MK (2016) A preliminary study on the birds of Thane Creek, Maharashtra, India. Journal of Threatened Taxa 8: 8797-8803.
7. Nerlekar A, Warudkar A, Gowande G, Salve S, Raut A, et al. (2016) A review of the faunal diversity of the Fergusson College campus, Pune, India. Zoo's Print 31: 4-25
8. Kumar A, Chaube RP, Kanaujia A (2018) New Records of Birds from the Shahid Chandra Shekhar Azad Bird Sanctuary (SCSABS) of Unnao, Uttar Pradesh, India. J Wildl Res 6: 17-23.
9. Pain DJ, Green RE, Gieβing B, Kozulin A, Poluda A, et al. (2004) Using stable isotopes to investigate migratory connectivity of the globally threatened aquatic warbler Acrocephalus paludicola. Oecologia 138: 168-174.
10. Marova I, Shipilina D, Fedorov V, Alekseev V, Ivanitskii V (2017) Interaction between common and Siberian Chiffchaff in a contact zone. Ornis Fennica 94: 66-81.
11. Moreno-Opo R, Belamendia G, Vera P, Onrubia A, Monteagudo A, et al. (2015) Differential migration in the Common Chiffchaff Phylloscopus collybita: sub-Saharan wintering grounds host more adults and females as well as birds of larger size and better physical condition. Ardeola 62: 237-253.

12. Bensch S, Jönsson J, Copete JL (2012) Low prevalence of Haemoproteus infections in Chiffchaffs. Parasitology 139: 302-309.
13. Bensch S, Hansson B, Hasselquist D, Nielsen B (2000) Partial albinism in a semi-isolated population of Great Reed Warblers. Hereditas 133: 167-170.
14. Šoštarić I (2016) Sex differences in morphology and migration timing of Chiffchaff Phylloscopus collybita and Willow Warbler Phylloscopus trochilus in Northern Poland.
15. Newton I (2004) Population limitation in migrants. IBIS 146: 197-226.
16. Rodrigues M, Crick HQ (1997) The breeding biology of the Chiffchaff Phylloscopus collybita in Britain: A comparison of an intensive study with records of the BTO Nest Record Scheme. Bird Study 44: 374-383.