



Breeding Performance of the Red-vented Bulbul *Pycnonotus cafer* in Pakistan

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Article Info

Original Research

Received 5 February 2014

Accepted 5 April 2015

Keywords

Breeding

Mansehra

Pakistan

Pycnonotus cafer

Red-vented Bulbul

Abstract

The breeding performance of the Red-vented Bulbul *Pycnonotus cafer* was studied at the Tehsil Mansehra, KP Province of Pakistan during the breeding season from May to August 2013. Pair formation in Red-vented Bulbul occurred in March and April, followed by nest construction. During the breeding season 37 nests were observed with 88 eggs. The Red-vented Bulbul preferred leafy, dense shrubs and smaller trees for nest construction. Average plant and nest height was 2.2 ± 0.2 and 1.9 ± 0.3 m, respectively. Mean clutch size was 2.3 ranged 1–3. Egg length and breadth was 20.2 ± 0.6 and 16.0 ± 0.6 mm. Egg volume and Egg shape index was $2.6 \pm 0.2 \text{ cm}^3$ and 1.24 ± 0.02 . There was significant correlation found between egg length and breadth in relation to clutch size ($P < 0.05$). Egg success was 55.6% and nest success was 59.4%. Main reasons for breeding failures were unhatched eggs, weather conditions and observer's disturbance. Average fledgling produced per nest was 2.2.

1. Introduction

The family Pycnonotidae (bulbuls) is a large group of passerines comprising 138 species and 355 taxa, widespread in southern Asia, Africa, Madagascar, and islands of the western Indian Ocean (Sibley & Monroe 1990; Fishpool & Tobias 2005). Five species are reported to occur in Pakistan (Lepage 2007), the Red-vented Bulbul being one. It is a common species in Pakistan (Roberts 1991 & 1992), being widely distributed throughout the Indus plain and cultivated areas of all provinces except Baluchistan or any desert area (Roberts 1991). Many studies have been carried out on breeding aspects of Red-vented Bulbul (Ali 1930; McCann 1931; Baker 1932; Dutt 1932; Dixit 1963; Lamba 1968; Dhondt 1977; Vijayan 1980; Watling 1983; Balakrishnan 2007; Prajapati *et al.* 2011; Rao *et al.* 2013; Manju & Sharma 2013; Zia *et al.* 2013).

However, no such studies have been carried

out in Mansehra, where it is abundant. The aim of this paper is to present, in the context of similar studies from other parts of the species' breeding distribution, plant and nest height, egg dimensions including egg length, breadth, volume and egg shape index and breeding success and failures of Red-vented Bulbul in Tehsil Mansehra.

2. Materials and Methods

2.1. Study Area

This study was conducted in Tehsil Mansehra, in an area bounded by $34^{\circ}14'$ to $35^{\circ}10'$ N and $72^{\circ}55'$ to $74^{\circ}6'$ E, covering 1,486 square miles at 1088 meters asl, and is 140 km northeast of the capital, Islamabad. Tehsil Mansehra is bordered in the east by Tehsil Balakot and in the west by Tehsil Oghi in Mansehra District, in the north by Battagram and in the south by Abbottabad Districts (Fig. 1). The area's climate is severe: hot in summer (up to 40°C)

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and cold (5°C) in winter (SMEDA 2009). The vegetation community of the study area mostly consists of *Populus euphratica*, *Platanus orientalis*, *Pinus roxburgii*, *Morus alba*, *Melia azedarach*, *Eucalyptus camaldulensis*, *Prunus armeniaca*, *Broussonetia papyrifera*, *Acacia nilotica*, *Acacia nilotica*. Shrubs such as *Berberis lycium*, *Rubus pedunculatus*, *Jasminum officinale*, *Rubus ellipticus* and *Vitis vinifera* are common.



Fig. 1. Map of District Mansehra showing its sub-divisions. The study area is Tehsil Mansehra in between Tehsils Balakot and Oghi.

2.2. Methods

The study covers a period of four months from May to August 2013. We found 37 nests with a total of 88 eggs, some nests being tracked by following the birds while they were carrying food and nesting materials to their nests. All the nests were inspected directly to see the contents of the nests and to record egg laying dates and for that each nest was visited thrice in a week. Plant and nest height was measured in meters (m), by means of a measuring tape. Egg length and breadth was measured by a Vernier Calliper with precision of 0.1 mm. Egg volume was calculated by following this formula: $V = 0.51 \times L \times B^2 / 1000$ (Hoyt 1979). Egg shape index was calculated by the ratio L/B . During the study period, other activities of the Red-vented Bulbul were also observed. Murray (2000) was followed to calculate Hatching Success and Nest Success as measures of Reproductive Success. Hatching Success was calculated as “the proportion of eggs that hatched successfully” and Nest Success was calculated

as “the proportion of nests surviving incubation”. Thus, number of nestling that fledged divided by total number of eggs gave Hatching Success while number of clutches that produces fledgling was divided by total number of clutches to obtain Nest Success. Statistical analyses were performed by using student t-test. All the mean values are given with Standard Deviation (Mean \pm SD).

3. Results

3.1. Breeding season

The breeding season starts in early May and ends in late August in the study area. Breeding activities including; number of clutches, hatchlings and fledglings were peaked in June and July (Fig 2).

3.2. Nesting site, plant and nest height

The nest of the Red-vented Bulbul is cup-shaped and constructed of twigs, rootlets, grasses and cobwebs (Fig. 3); regrettably, plastic detritus was also present. The species preferred nesting in shrubs and also in smaller trees in irrigated fields, at road-sides and near houses. Details about nest presence on different plant species are in (Table 1). No nest was found on any man-made structure. Mean plant and nest height was 2.2 ± 0.2 and 1.9 ± 0.3 m. Details of the different plant and nest heights are presented in (Table 1). During the breeding season, both sexes contributed to nest construction and nests were usually placed in shrubs at bifurcated, branches, trifurcated branches and even where 4–5 branches held the nest.

Table 1. Mean plant and nest heights and nest habitat percentage with total number of plants and nests.

Plant Types	Plants & Nest Nests (N)	Nest %	Plant Height (m)	Nest Height (m)
<i>Berberis lycium</i>	5	13.5	1.8 ± 0.1	1.4 ± 0.1
<i>Rubus pedunculatus</i>	5	13.5	1.6 ± 0.2	1.2 ± 0.2
<i>Jasminum officinale</i>	10	27.1	2.0 ± 0.3	1.8 ± 0.2
<i>Vitis vinifera</i>	12	32.4	2.5 ± 0.7	2.1 ± 0.6
<i>Morus alba</i>	5	13.5	2.9 ± 0.3	2.8 ± 0.4
Total/Mean	37	100	2.2 ± 0.2	1.9 ± 0.3

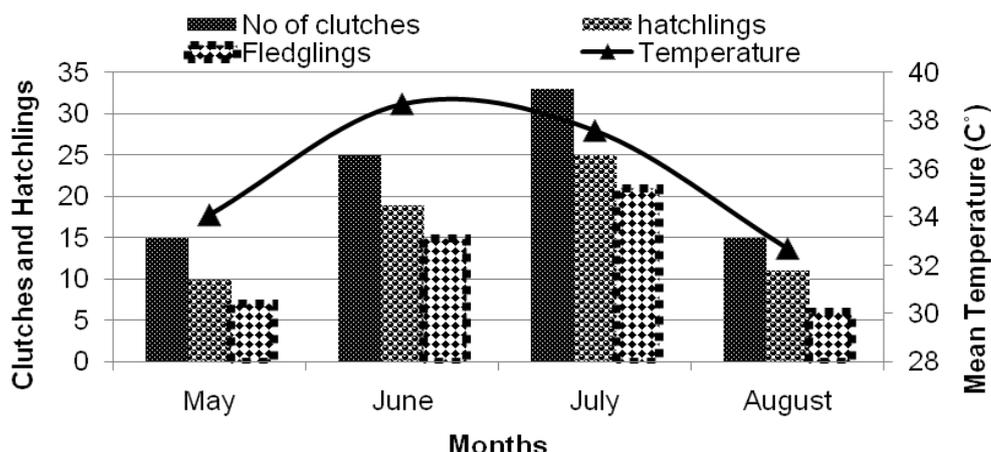


Fig 2. Breeding activities of *Pycnonotus cafer* including no of clutches, hatchlings, fledglings and temperature variation.

Table 2. Egg dimensions in relation to clutch size of Red-Vented Bulbul at Tehsil Mansehra.

Clutch size	N (Nest)	N (eggs)	Mean length (mm)	Mean breadth (mm)	Mean Volume (cm ³)	Egg shape index
1	6	6	19.6±0.3	15.7±0.4	2.4±0.2	1.24±0.01
2	11	22	20.8±0.9	16.8±0.6	2.9±0.1	1.23±0.03
3	20	60	20.3±0.6	16.1±0.8	2.6±0.3	1.26±0.02
Mean	37	88	20.2±0.6	16.0±0.6	2.6±0.2	1.24±0.02

Table 3. Causes of egg and nesting failures of Red-vented Bulbul.

	Egg Failures		Nesting Failures	
	N	Percentage %	N	Percentage %
Unhatched eggs	29	33.0	-	-
Disappeared from nests	6	6.8	7	18.9
Eggs destroyed accidentally	4	4.5	-	-
Mortality (Unknown causes)	-	-	4	10.8
Mortality (Bad weather)	-	-	4	10.8
Total Failures	39	44.3%	15	40.5%

3.3. Clutch size and egg dimensions

In the study area, clutch size of Red-vented Bulbul was 2.3, ranging from 1–3, six nests being in clutch size 1, 11 in clutch size 2 and 20 in clutch size 3 (Table 2). The eggs are pinkish white, and quite profusely blotched with purple brown or claret. Mean egg length and breadth: 20.2±0.6mm and 16.0±0.6mm respectively. There is significant correlation between egg length and breadth in relation to clutch size (P<0.05). Egg Volume and Egg shape index was calculated to be 2.6±0.2cm³ and 1.24±0.02 (Table 2).

3.4. Incubation and nestling period

According to our observations, the incubation period of the Red-vented Bulbul lasted on average 12.8±4.9 days, varying from 11 to 15 days. First nest with eggs was observed in early May while last nest with eggs was observed in mid-August. The nestling period is defined as the interval of time the last chick of the brood remained in the nest. We recorded the nestling period as 13.0±1.5 days, varying from 12–14 days. First nestling was observed in mid-May while last nestling was observed in late August.



Fig. 3. Nest architecture of Red-vented Bulbul showing twigs, plastic particulates, rootlets, grasses and cobwebs intermixed. 02 June 2013 © M. Awais

3.5. Breeding success and breeding failures

From the total of 37 nests, 49 chicks fledged successfully. Hatching success was 55.6% (49/88). Of these 37 clutches, only 22 produced successful broods; so nest success was 59.4%. The number of fledglings produced per nest was 2.2 (49/22). Of total 88 eggs, 39 failed (44.3%). Reasons for egg failures were; 29 did not hatch (33.0%), 6 eggs disappeared from the nests during incubation (6.8%), and 4 were accidentally destroyed during inspection (4.5%). Total nesting failure in the study area was 40.5%. Among the nests that failed completely, rain or bad weather chick mortality accounted for 4 (10.8%), chicks disappeared from 7 due to unknown causes (18.9%) and broods were found dead at 4 (unknown causes, 10.8%) (Table 3).

4. Discussion

Results of current study showed that the breeding season of the Red-vented Bulbul extended from May to August with the peak of breeding activities in June and July but other authors noted different period from place to place in the range of the species. In general, breeding season of the Red-vented Bulbul is reported to be from April to September with a peak in August–September in Balaram-Ambaji Wildlife Sanctuary Gujarat (Prajapati *et al.* 2011). According to Rao *et al.* (2013), breeding season of this species was from March to October with peak breeding activities in September in Sikar Region, India. Breeding

season lasted March–May in Haryana (Manju & Sharma 2013). Newton (1964) reported year to year variation in the breeding season and peak of breeding activities.

We surmise that the Red-vented Bulbul did not nest on any man-made structure in the study area because the quality and quantity of the vegetation provided adequate prime habitat. In the study area, *P. cafer* nested on 5 different plant species with an average height of 1.9m. These findings are somewhat similar to findings of Vijayan (1980), Watling (1983) and Zia *et al.* (2013) who reported that the species favoured nesting at between 1–4m above the ground. Similarly, nesting heights in bushes of around 2–3m were reported by Inglis (1922) and Dixit (1963). Nests constructed of twigs, plastic particulates, rootlets and grasses and metal wires have also been observed by Lamba (1968). According to Prajapati *et al.* (2011), the species nested on 12 different plant species, generally at a height of 1.5–3.0m but did not favour nesting at a height below 1.0m. In Sikar Region, nests were in four different plant species, but some were on man-made structures such as electricity boxes and wires (Manju & Sharma 2013). In Haryana, nests were at a height of 2.0–3.5m on 12 different plant species (Rao *et al.* 2013). In Islamabad-Rawalpindi, Red-vented Bulbul nested in 5 different plant species, including *Zizyphus nummularia*, *Psidium guajava*, *Dalbergia sissoo*, *Dodonaea viscosa* and *Phoenix dactylifera* (Zia *et al.* 2013).

The eggs of Red-vented Bulbul are pale-pinkish with spots of darker red which are dense at the broad end (Jerdon 1863). Clutch size of Red-vented Bulbul in the study area was 2.3 ranging from 1–3, somewhat lower than the 2–3 found by other authors, including Ali & Ripley (1971), Vijayan (1980), Prajapati *et al.* (2011), Manju & Sharma (2013) and Rao *et al.* (2013). Mean clutch size of Red-vented Bulbul in Fiji was 2.5 (Watling 1983). Average clutch size reported by Zia *et al.* (2013) was 2.5, ranging from 1–4. The variation in clutch size is shown to be correlated with availability of food for the young; a larger clutch size is laid when such food is abundant (Vijayan 1980). Average egg length and breadth measured by Prajapati *et al.* (2011) was 20.0 and 16.6mm in Balaram-Ambaji Wildlife Sanctuary Gujarat, relatively larger than we. Rao *et al.* (2013) recorded egg

length and breadth of 18.8 and 14.6mm in Sikar Region, relatively smaller than we recorded in Tehsil Mansehra. Investment in egg size might be correlated with the total survival energy demand on the female vis-à-vis the pre-nesting energy input from food; low input, fewer and smaller eggs, whereas high input more and larger eggs (Horak *et al.* 1995).

Incubation and nestling periods recorded by us are differing slightly from other studies in the species breeding distribution. Ali & Ripley (1971) recorded an incubation period of 14 days and nestling period of 12 days. Prajapati *et al.* (2011) recorded an incubation period of 11–14 days. Manju & Sharma (2013) recorded an incubation period of 9–12 days and nestling period of 14 days. The incubation period recorded by Rao *et al.* (2013) was 11–13 days while nestling period was 12 days. Incubation and nestling periods recorded by Zia *et al.* 2013 were 11–13 days. The variations in incubation and nestling periods depend upon the number of young in brood, availability of food, nest height and age of parents (Dhanda & Dhindsa 1998).

Breeding success recorded in the study area was relatively higher (hatching success of 55.6% and 59.4% of nest success) than recorded by other authors in the species breeding distribution. Prajapati *et al.* (2011) recorded egg success of 53% and nest success of 37%, similarly Rao *et al.* (2013) recorded egg success of 50% and nest success of 54%. Breeding performance recorded in the study area was slightly reduced due to heavy rainfall and high predation. The good egg success and nest success in the study area were probably due to good vegetation and food resources. In the study area, environmental factors, nest placement, nesting material and availability of food were favorable for moderate breeding success of *P. cafer* in the study area.

Acknowledgements

The corresponding author pays sincere gratitude to his father, Muhammad Saeed, for the moral and financial support to achieve this work. We also thank to Dr. Fiaz Department of Botany, Hazara University, Mansehra for identifying plant species. We would also like to thank the editor for his valuable comments and for improving the manuscript.

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