The Journal of Animal & Plant Sciences, 28(2): 2018, Page: 647-650
ISSN: 1018-7081

Short Communication

# FEEDING AND BREEDING ECOLOGY OF ASHY-WREN WARBLER (*Priniasocialis*) IN POTHWAR PLATEAU, PAKISTAN

M. Sarwar*[1] and I. Hussain[2]

[1]Office of Deputy Director Wildlife, Sahiwal Region, Wildlife & Parks Department, Punjab, Pakistan
[2]Department of Wildlife Management, PMAS-Arid Agriculture University, Rawalpindi Pakistan
*Corresponding author E-mail: smisbah336@gmail.com

## ABSTRACT

Ashy-wren warbler (*Priniasocialis*) is a common inhabitant of the agro-ecosystem of Pothwar plateau, Pakistan but data on its feeding and breeding ecology in this area are lacking. We investigated the diet and breeding of this bird in farmlands of Pothwar plateau. The analysis of 200 fecal samples showed that *P. socialis* is an insectivorous bird and feeds on flies, mosquitoes, bugs, termites, aphids, weevils and beetles. Breeding data revealed that these birds nest in low shrubs during May to September. We found 30 nests having 112 eggs in total. Mean (±SD) clutch size was 3.73 ± 0.79whileaverage incubation period and nestling period was 11.65 ± 0.52 days and 11.89 ± 0.68 days respectively. Hatching, fledging and breeding success was 62.06%, 50% and 31.03% respectively. The main threats to the species were predation, human disturbance and harsh weather.

**Keywords:** Ashy wren warbler, ashy prinia, food habits, breeding, farmland

## INTRODUCTION

The Ashy-wren warbler or Ashy prinia(*Priniasocialis*) is a small passerine bird resident in parts of India, Pakistan, Bhutan, Sri Lanka, Nepal and Bangladesh. This bird is a common inhabitant of open grassland, woodland and scrub. It has also acclimatized well to urban gardens and farmlands (Ali and Ripley, 1997). Although reported to be insectivorous (Roberts, 1992; Rasmussen and Anderton, 2005) little is known about itsbiology and ecology in Pakistan.However, in a study of diet composition of this bird in cotton-wheat based agro-ecosystem of Punjab, Pakistan Hussain and Afzal (2005) have revealed that bugs were preferred by this bird but thrips, bees, ants, wasps, termites, flies, mosquitoes, butterflies and weevils were also found in its gizzard.

Here we designed a study to investigate the diet and breeding of this bird in the farmlands of Pothwar plateau, Pakistan.

## MATERIALS AND METHODS

**Study Area:** This study was conducted in the agro-ecosystem of Pothwar plateau, Pakistan (33° 30′ 0″ and 73° 0′ 0″) which is a dissected region with undulating topography, gullies, low fertility and erratic rainfall falling mainly in July and August. Around 110,600ha area of Pothwar plateau is being cultivated (GOP, 2002-03). Four percent of the cultivated area of Pothwar plateau is irrigated while 96% depends on rain (Majeed *et al*., 2010). Agriculture consists of two types of cropping systems: wheat-maize/millet and wheat-groundnut. Wheat is generally intercropped with mustard (*Brassica campestris*) (Arif and Malik, 2009). Crop fields are usually small in size and there are patches of wild vegetation interspersed with cultivated areas.

**Diet:** We analyzed the diet of *P. socialis* through droppings. In order to ensure correct identification, the birds were followed to collect their fresh droppings. A total of 200 samples were collected over a period of two years (June 2013 to May 2015). Season-wise distribution resulted into 40 samples each into fall (September-November), winter (December-February), spring (March-April), summer (May-June) and monsoon (July-August) season. Individual droppings were collected in plastic vials with a label containing all possible information and were immediately transported to the laboratory for analysis.Along with fecal sampling, we collected all insect faunapossibly contributing in food of the species on the literature based information (Roberts, 1992; Hussain and Afzal, 2005).The insects were collected by sweep nets and live insects were put in the cyanide killing bottle for ten minutes after which the dead specimens were preserved in insect boxes. The cyanide killing bottle was prepared by using 25g of potassium cyanide crystals and 1.5cm dry layer of plaster of Paris. It was allowed to set and dry and then covered by a disc of blotting paper to absorb moisture (Upton, 1991). Being not an expert "Entomologist", the investigator sought help from the Department of Entomology, PMAS-Arid Agriculture University, Rawalpindi for insect identification, preservation and maintenance of the collection.

In the laboratory, fecal contents were segregated first by eye and then by using 10X hand lens).Since intact insect specimens were unlikely to be recovered, the isolated sub-samples of droppings were mounted in slides

after treatment with alcohol. We were not able to detect nectar following this method. The slides were studied in detail and the insect parts in the droppings were identified up to order level following Asokan *et al.* (2009). The proportion of different food components in the diet were estimated on the basis of Food Importance index (FII) following Bhandary *et al*. (1986) and Hussain and Sultana (2013).

$$\text{Food Importance Index (FII)} = \frac{\%\text{Frequency} + \%\text{Composition}}{2}$$

Where,

$$\text{Frequency (\%)} = \frac{\text{No. of microfield locations in which a species occurred}}{\text{Total No. of microfield locations examined}}$$

and

$$\text{Composition (\%)} = \frac{\text{Occurrence of a food item in a sample}}{\text{Total occurrence of all food items}} \times 100$$

**Breeding:** The nests were sought in the study area during March, 2014 to September2014by following the birds carrying nesting material and by behavioral observations and cues of nest construction. Thirty active nests were located in total. These nests were visited every two days.Each nest was studied for identification of vegetation hosting the nest,height of the nest from the ground, identification of vegetation material used for nest construction, outer and inner diameter of nest and depth of nest.

We collected data on clutch size, egg laying intervals and incubation period. The date of first egg laying was noted by direct observation whenever possible. In case of spotting a nest with eggs already laid, the clutch initiation date was calculated through back dating by subtracting the hatching date from the mean incubation period following Fazili*et al*. (2013)whereas mean incubation period was found to be 11.63days. During observation, care was taken to minimize bird and nest disturbance. The incubation period was calculated as the time interval (in days) between the laying of the last egg and hatching of first egg. The dimensions (length and width) of freshly laid eggs were measured (mm) with Vernier Calipers whenever possible to avoid stress to the parent birds. The egg shape index was calculated following Dolenec (2006).

$$\text{Egg shape index (ESI)} = \frac{\text{Length of egg (L)}}{\text{Breadth of egg (B)}}$$

Hatching, fledging and breeding success was calculated by the following formulae described by Ali *et al*. (2010) and Fazili*et al*. (2013).

$$\text{Hatching success} = \frac{\text{No. of eggs hatched}}{\text{Total No. of eggs laid}} \times 100$$

$$\text{Fledging success} = \frac{\text{No. of nestlings fledged}}{\text{Total No. of eggs hatched}} \times 100$$

$$\text{Breeding success} = \frac{\text{No. of nestlings fledged}}{\text{Total No. of eggs laid}} \times 100$$

Egg survival during incubation and nestling survival during nestling period were estimated on the basis of daily survival rate of eggs and nestlings following Mayfield (1975).

$$\text{Egg/Nestling survival} = (\text{Egg/Nestling DSR})^{d}$$

Where,

DSR = daily survival rate

d= Average Incubation/Nestling Period

Daily survival rates were calculated as follows.

$$\text{Daily Survival Rate (DSR)} = 1 - \frac{\text{No. of failed eggs during incubation/nestling}}{\text{No. of exposure days when nest is at risk}}$$

We also looked for the threats to the eggs/nestlings. These included anthropogenic activities, harsh weather and predators.

## RESULTS

**Diet:** Based on the results of 200 sample fecal analysis, the bird can be designated as completely insectivorous. The insects belonging to order Diptera (flies and mosquitoes), Isoptera (termites), Hemiptera (bugs, aphids and cicadas), Coleoptera (beetles and weevils) and sub-order Homoptera (planthoppers, leafhoppers and whiteflies) were identified (Table 1). During winter and spring seasons, insects belonging to order Hemiptera were preferred followed by Coleoptera and Isoptera whereas insects belonging to order Diptera were least preferred. During summer and monsoon Homoptera were also consumed. During fall highest preference was recorded for Coleoptera followed by Hemiptera while consumption of insects belonging to Diptera and Isoptera had relatively lower preference.

**Breeding:** Among the 30 nests located, four were found in May, two in June, 12 in July, eight in August and four in September. All the nests were found in the egg/building stage.Both the sexes participated in nest constructionand no additional helping birds were observed. The nests were recorded at a mean height of 1.74 m $\pm$ 0.21(SD) from ground level in shrubs. Distribution of the nests with respect to the shrub species revealed presence of 14 nests in *Cenchrusciliaris* and eight each in *Prosopisjuliflora* and *Lantana camara*. Soft twigs, dry herbs and grasses were used for nest construction. The nests were cup-shaped and finely built with the inner lining of root hair of plants.

The measurements of nests showed average outer diameter of 10.29 cm $\pm$0.58SD (range 9.7 - 11.3), average inner diameter 6.45cm $\pm$ 0.44SD (range 5.9 - 7.1) and the average depth of 4.44cm $\pm$ 0.53SD (range 3.6 - 5.3). Nest shifting behaviour was also observed in eight cases. Whenever the nest was spotted during nest building stage, the parent birds dismantled the nest and used the material for constructing another nest in close vicinity of the abandoned location.

In 30 nests of Ashy prinia (*P.socialis*) we recorded a total of 112 eggs implying the mean clutch size was 3.73 $\pm$ 0.79SD. Among these, 14 nests had 3 eggs, 10 nests had 4 eggs while six nests had 5 eggs. The eggs were crimson red in color with mean length of 15.71mm $\pm$0.48SD (n=40, range = 14.9 – 16.5) and average breadth

of 11.48mm ± 0.60 (range = 10.7 – 12.8) while egg shape index was 1.37 ± 0.09.

The incubation period was 11.65 ± 0.52SD days (range 11-12 days). Among the 30 active nests, fledging took place in only 16 (53.33%) while 14 nests failed completely to produce viable chicks (six nests failed during incubation and eight nests failed during nestling). Of the 14 nests that failed, 12 were predated and two lost its occupants due to harsh weather. In all these nests, complete loss of eggs and/or nestlings was recorded. The predators were domestic cats, rodents, snakes. The humans were also poachers of this bird. The nests that succeeded to contribute in the population had 58 eggs in total, among which 36 hatched and 22 failed with hatching success of 62.06% and egg survival rate during incubation was 0.53 (Table 2). Mean nestling period was estimated to 11.89 ± 0.68 days (range 11-13days, n = 36). The fledging success was 50% (with 18 fledged out of 36 hatched). Nestling survival during nestling period was 0.65. Overall breeding success of this species was found to be 31.03%.

**Table 1. Food Importance Index of seasonal diet composition of Ashy prinia (*Priniasocialis*) inhabiting croplands of Pothwar plateau, Pakistan.**

| | Seasonal Food Importance Index | | | | |
|---|---|---|---|---|---|
| **Insect Orders** | **Winter (n=40)** | **Spring (n=40)** | **Summer (n=40)** | **Monsoon (n=40)** | **Fall (n=40)** |
| Diptera | 2.55 | 2.58 | 2.56 | 2.11 | 2.06 |
| Isoptera | 4.14 | 3.12 | 3.09 | 2.06 | 2.12 |
| Hemiptera | 4.59 | 4.15 | 3.11 | 3.60 | 3.62 |
| Coleoptera | 4.23 | 3.65 | 3.7 | 3.68 | 4.71 |
| Homoptera | - | - | 2.04 | 3.55 | - |

**Table 2.Mayfield survival probability for *Priniasocialis* during incubation and nestling stages.**

| | **Incubation stage** | **Nestling stage** |
|---|---|---|
| Exposure days | 417 | 318 |
| Total number of eggs/nestlings observed | 58 | 36 |
| No. of eggs/nestlings failed | 22 | 18 |
| Daily survival | 0.95 | 0.97 |
| Success rate | 0.53 | 0.65 |

## DISCUSSION

The outcome of current study has designated ashy prinia (*Priniasocialis*) insectivorous species which is supported by the observations of Roberts (1992) and Rasmussen and Anderton (2005) but nectar would not be detected by our methods. Indeed Balachandan and Lima (1992) observed this species feeding on flower nectar as well. It could be expected that micro-histological technique employed in current study might not be able to detect remains of delicate nectars in the fecal samples or their presumable disappearance during the digestion process. The insect based food of this bird was comprised of order Diptera, Isoptera, Hemiptera, Coleoptera and Homoptera with preference for bugs during winter and spring and beetles and weevils for rest of the period. However, termiteswere least consumed insect. Hussain and Afzal (2005) have reported similar feeding habits of this bird inhabiting cotton and wheat croplands of Punjab, Pakistan.

George (1962) and Pachlore and Pachlore (2012) have reported thebreedingseason of ashy prinia (*Priniasocialis*) from March to September in southern India while Balachandaran and Lima(1992) recorded its breeding period from June to September in north India. Since no nests of this prinia were recorded in the months of March-April therefore, it seems in agreement with the finding of the later study. Such small variation within wide span of seasonal breeders could be attributed to latitudinal variations of the study locations and local climatic factors.

The prinia nests were found in *Cenchrusciliaris*, *Prosopisjuliflora* and *Lantana camara* whereas George (1962) and Reginald *et al*. (2014) have reported its association with *Cenchrusciliaris* and *Lantana camara* only. The nests height from ground level (1.74 m) recorded in this study is much higher as compared to observations of George (1962) and Pachlore and Pachlore(2012) who reported the height in the range of 0.65-0.91 mbut we found no nests at such a low height which may be attributed to adaptation of the species to survive in human mediated landscapes. The nest dimensions recorded in this study are similar to those reported by Ali and Ripley (1987) but somewhat larger than those reported by Jairamdas (1977) and Ramanan (1995). The clutch size of 3-5 eggs is in agreement earlier reports of Ali and Ripley (1987) and Ramanan (1995). The average incubation period of *P. socialis* was found to be 11.65 ± 0.52 days. Chakravarthy *et al*. (1980) and Ali (2002) have also reported that eggs of

this bird hatching in about 12 days. The estimated nestling period of 11.89 ± 0.68 days is also supported by the records of Subramanya and Veeresh (1998) and Rasmussen (2005) in India. The nest predation by cats and rodents and destruction by human activities and harsh weather condition is also evident by the records of Roberts (1992) and Pachlore and Pachlore (2012). The self nestdismantlingbehavior by this species in response to spotting any predator and/or invader (human) has been documented by Pachlore and Pachlore (2012) and Jones *et al*. (2007) who found the bird dismantling its own nest and using the same materials to reconstruct it at nearby safe place to mitigate the predatory threats.

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