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Nest Density, Clutch Size and Egg Traits of House Crow *Corvus splendens* at Ghazikot Township, Mansehra, Pakistan

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Abstract

This study was conducted in Ghazikot Township (150 acre), Mansehra during 2014 breeding season. Mean nest density of the House Crow was 3.1 nests/acre. The mean clutch size recorded 4.1 egg ranged 3-6. Mean egg length and breadth 37.6±0.71 and 25.3±0.52mm, respectively. Mean egg volume 12.7±0.73cm^3 and egg shape index calculated to be 1.48±0.022. Mean weight of the House Crow egg recorded 11.77±0.39g. There is no significant correlation exists between egg length and breadth in relation to different clutch size (P>0.05) and similarly there is no positive correlation exists between weight of House Crow eggs in relation to different clutch size (P>0.05).

Keywords: Clutch size, *Corvus splendens*, Ghazikot, House Crow, Mansehra, Nest density

1. Introduction

House Crow is a bird species originated in Indian subcontinent including Myanmar, Nepal and Sri Lanka (Ryall [25], Habib [15]). Many studies related to breeding biology of House Crow have been carried out during the last 4 decades (Newmann [21], Oatley [22], Clancey [8], Sinclair [26], Goodwin [12], Bennett [4], Sinclair*et al*. [27], Bijlsma and Meininger [5], Feare and Mungroo [10], Ryall [24], Cramp and Perrins [9], Allan and Davies [1], Habib [15], Behrouzi-Rad [3], Goutam and Kushwaha [13]). House Crowis one of the common species in Pakistan where it spreads across the lower coastal areas of Baluchistan in Makran and all the way through Indian basin to Swat, Mansehra plains and Abbottabad but does not occur in Muree (Roberts [23]). The House crow is a tree nester and forever it found in involvement with human surroundings (Ryall [24], Goodwin [12]). Normal clutch size of House crow is 4-5 and rarely 6-7 (Whistler [30]). The measurements of the eggs are essential life history variables in birds as hatching mass is greatly correlated with egg size for a large number of birds (Hegyi [16]). Hatched from a large egg could be advantageous for a newborn; but for laying female, high investment to egg size might struggle with her own energetic demands and willingness to produce more offspring's (Horak *et al*. [17]).

The objective of this paper is to present nest density, tree and nest height, eggs dimensions including egg length, breadth, volume, egg shape index and egg weight of House crow. The relationships among different egg dimensions were also examined.

2. Material and Methods

2.1. Study Area

Study was conducted in urban housing scheme (phase 1) Ghazikot Township (34°31'N, 73°12'E) located in the District Mansehra, at an altitude of 1,040 m. Ghazikot Township (150 acre) was formed by N-WFP Government now Khyber Pakhtoonkhwa in 1985 and now consists of 300 houses and many of the plots are not yet constructed. Study area serviced by an extensive road networks with plantation at the road edges, comprises middle-class homes, as well as mosques, hospitals, schools and colleges, markets and public parks shown in (Fig. 1). Climate of the area is severe i.e. hot in summer up to 40 ˚C and 5 ˚C in winter (SMEDA [29]). Main vegetation of the study area consists of *Populus euphratica, Platanus orientalis, Pinus roxburgii, Melia azedarach, Eucalyptus camaldulensis, Broussonetica paperfera, Acasia nilotica* and many other fruit as well as ornamental plants.

Fig 1: Aerial photograph of Ghazikot Township, Mansehra where breeding characteristics of House crow eggs were studied.

2.2. Study Period and Data Collection

The study period covers six months from April to September 2014. House crow is one of common bird species in the study area. During nest searching 47 nests were found of which 24 were active with total 99 eggs. For direct inspection of nests, all trees with nests were climbed to see anterior of nests for presence of eggs and on some occasions ladder was also used where climbing was not possible. Photographs of the eggs were taken by Traveller XS-4000 digital camera with 4X optical zoom and 5.0-20.0 mm lenses. Nests were also examined from the ground with the help of binoculars to see signs of incubating eggs. Nest density was estimated as number of nests per acre on the basis of total found nests i.e. 47 nests found.

2.3. Measurements

Tree height from ground to top and nest height from ground to nest were measured by common measuring tape. The egg weight was taken on common weighing bar. The egg length and breadth was measured by Vernier Calliper with Least Count 0.1 mm. Egg volume was calculated using the formula (Hoyt [18]):$V = 0.51 \times L \times B^2/1000$, where V is the volume in cm^3, L is the length and B is the breadth in mm. An egg shape index(ESI) calculated by using following formula: ESI = L/B.

2.4. Statistical Analysis

Statistical analyses were performed by using One Way ANOVA (Analysis of Variance) and student *t*-test. ANOVA was used to compare egg weight in relation to different clutch size while *t*-test was used for comparison of egg length and breadth. Significance of tests were accessed at *P*=0.05. Mean descriptive statistics are followed by Standard Deviation (SD).

3. Results

3.1. Nest density, Tree and Nest Heights

Mean nest density of the House crow was 3.1 nest/acre. Each nesting tree has only a single nest. The House Crow nested on five different tree species in the study area. Active nests were present on *Populus euphratica* (37.5%), *Platanus orientalis* (25.0%), *Eucalptus camaldulensis* (16.6%), *Pinus roxburgii* (12.5%) and *Melia azedarach* (8.3%) (Table 1). The mean tree height was 15.1±6.1m. The maximum tree height was found in *P. roxburgii*(22.3m) and *E.camaldulensis* (19.9m) while was lower in *P. euphratica* (14.1m), *P. orientalis* (12.0m) and *M. azedarach* (7.0m). The mean nest height was 11.5±5.8m, the maximum nest height was found in *P. roxburgii* (18.7m) and *E. camaldulensis* (16.0m) while lower in *P. orientalis* (12.0m), *P. euphratica* (10.4m) and *M. azedarach* (4.5m) (Fig.2).

Table 1: Tree species having active nests of House Crow along with number of trees and percentage in Ghazikot Township, Mansehra, 2014

Tree Species having active nests	N	percentage
P. euphratica	9	37.5
P. orientalis	6	25.0
E.camaldulensis	4	16.6
P. roxburgii	3	12.5
M. azedarach	2	8.3
Total	**24**	**100%**

N= Number of trees

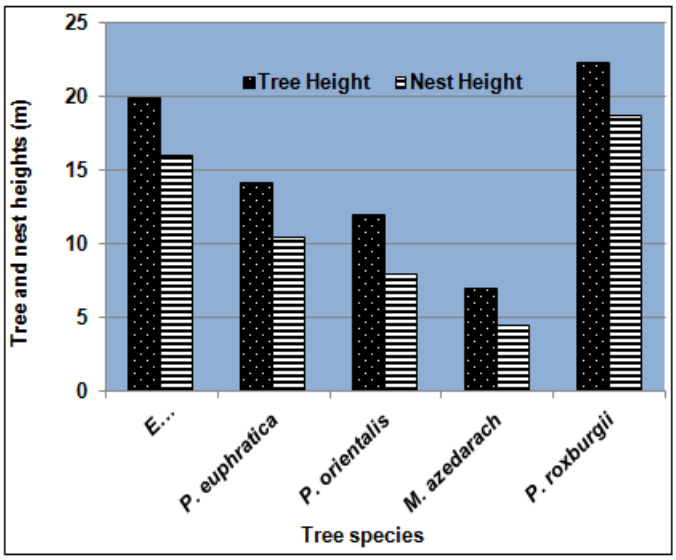

Fig 2: Mean tree and nest heights at Ghazikot Township, Mansehra.

3.2. Egg Dimensions

Eggs dimensions including mean egg length was 37.6 mm (SD=0.71, Range=32.0-46.2 mm, n=24), egg breadth 25.3 mm (SD=0.52, Range=21.0-30.5 mm, n=24), mean egg volume was 12.7 cm^3 (SD=0.73, Range= 7.1-21.9 cm^3, n=24) and mean egg shape index was 1.48 (SD=0.022, Range=1.39-1.53, n=24) given in (Table 2). There was no significant correlation exists between egg length and breadth in relation to clutch size (Table 3) (*P*>0.05).

Table 2: Mean egg characteristics of House Crow in Ghazikot Township, Mansehra, 2014

Egg Characteristics	N	Mean	SD	Range
Egg Length (mm)	24	37.6	0.71	32.0-46.2
Egg Breadth (mm)	24	25.3	0.52	21.0-30.5
Egg Volume (cm^3)	24	12.7	0.73	7.1-21.9
Egg Shape Index	24	1.48	0.022	1.39-1.53
Egg Weight (g)	24	11.8	0.42	9.0-14.6

N= Number of clutches

Table 3: Eggs characteristics of House Crow according to clutch size in Ghazikot Township, Mansehra, 2014

clutch size	N	length (mm)		breadth (mm)		volume (mm)		egg shape index		egg weight (g)	
		mean	SD	mean	SD	mean	SD	mean	SD	mean	SD
3	6	37.5	3.5	25.5	2.7	12.8	3.7	1.46	0.05	11.65	1.4
4	11	37.0	3.9	25.1	2.9	12.3	4.1	1.47	0.06	11.33	1.5
5	5	38.6	4.8	25.8	3.2	13.6	4.9	1.49	0.02	11.86	1.9
6	2	37.2	4.4	24.6	2.9	11.9	4.2	1.51	0.09	12.25	1.8

N= number of clutches

3.3. Egg Weight

Mean weight of the House Crow egg was 11.77 g (SD=0.39, Range=9.0-14.6 g, n=24) given in (Tables 2).There was no significant correlation exists among weight of House crow eggs in relation to different clutches (P>0.05). According to (Lack [19]) species producing comparatively larger eggs must reward by laying fewer eggs. There was no significant co-relation exists between egg weight and volume of egg (P>0.05) (Table 3). Comparison of the data with other studies shows that there is slight difference among egg length and breadth in relation to clutch size at 3 different study sites (P>0.05) (Table 4).

Table 4: Egg dimensions of House crow in relation to clutch size of Ghazikot Township (2014), compared with data from Islamabad-Rawalpindi (Habib [15]) and Kharag Island (Behrouzi-Rad [3]).

Study site name	Clutch size	N (nests)	N (eggs)	Mean length (mm)	Mean breadth (mm)	Mean weight (g)
Ghazikot Township (current Study)	**3**	6	18	37.5	25.5	11.65
	4	11	44	37.0	25.1	11.33
	5	5	25	38.6	25.8	11.86
	6	2	12	37.2	24.6	12.25
Mean	**4.1**	**24**	**99**	**37.6**	**25.3**	**11.77**
Kharag Island (Behrouzi-Rad 2010)	**3**	15	45	40.2	29.5	12.95
	4	60	240	39.5	27.5	12.86
	5	5	25	38.6	24.2	12.04
Mean	**3.8**	**80**	**310**	**39.0**	**27.6**	**12.62**
Islamabad-Rawalpindi (Habib Ali 2008)	**1**	2	2	39.1	25.8	12.45
	2	3	6	38.4	26.0	13.72
	3	8	24	36.9	26.3	12.16
	4	4	16	38.1	26.7	13.68
	5	8	40	37.5	26.3	12.90
	6	5	30	36.8	26.2	12.05
	7	1	7	39.2	27.5	15.84
Mean	**4.1**	**31**	**125**	**37.5**	**26.4**	**12.85**

3.4. Clutch Size

Clutch size of House crow was 4.1 ranged 3-6. Maximum of 11 clutches contained 4 eggs (Fig. 3), 6 clutches contained 3 eggs, 5 clutches contained 5 eggs and 2 clutches contained 6 eggs (Table 3).

Fig 3: One of clutch of House crow with 4 eggs.

4. Discussion

Nest density of House crow was 3.1 nests/ acre and is mush or less similar to other studies including Allanand Davies [1] and Habib [15]. In the study area nesting was all solitary and on trees none of the nest was found on man-made structure, somewhere else in the range of species both colonial and solitary nesting was detected by other authors proposing that solitary breeding were common (Godwin [12], Goutam and Kushwaha [13]). Other authors recommended colonial breeding to be more typical (Cramp and Perrins [9]). Colonial nesting was also observed by Ryall [24] but he suggested that these nests were well alienated. Both tree nesting and nesting on man-made structures was observed by other authors proposing that House crow is tree nester (Ryall [24]) and ledges on buildings are rarely selected for breeding purpose (Robert [23]). Cities where large trees are rare House crow made nests on man-made structures such as lamp posts and pylons (Anvery [2]). According to (Soh *et al.*[28]) trees forks, building and street lights serve as nesting sites.

House crow nested on 5 different tree species in study area and contrast to study area House crow nested in 12 dissimilar species in Durban, South Africa (Allan and Davies [1]). According to Habib [15] House crow used 23 species of trees for nest construction in Islamabad-Rawalpindi, Pakistan. In Mauritius, nests were mainly situated in *Fiscus bengalensis, Tebeuia pentaphylla, Callistemum* spp and *Mangifera indica* reported by Feare and Mungroo [10].

House crow construct its nest 3.0m or above from the ground (Grimmett *et al.* [14]). Tree height recorded by us in the study area was 15.1 m while (Habib [15]) recorded tree height 12.2m. Nests were usually at the height of 10.0 m from the ground in the tall trees in Mauritius (Ryall [24]). Nests were positions at height of 11.5 m in the study area. Contrast to present study, in Kenya nests were positioned at an average height of 7.3m and 6.4m at two different sites reported by (Ryall [24]). Mean height of nests is 9.5m in Islamabad-Rawalpindi (Habib [15]). Mean height of the nest at Durban was 13.5 m (Allan and Davies [1]).

According to (Roberts [23]) clutch size of House crow is usually 4 eggs but 3-6 are also found with a varying in shades of bluish green, blotched, speckled with red and sepia browns and grey under markings. Study area clutch size was 4.1 contrasted to Kharg Island 3.8 (Behrouzi-Rad [3]) and Mombasa 3.9 (Ryall [24]). At Islamabad-Rawalpindi 4.1(Habib [15]) and Merewent, South Africa 4.1 (Allan and Davies [1]) is same to current study.

Egg characteristics vary from place to place in the range of species. In study area House crow egg length and breadth was 37.6 and 25.3 mm. Egg length and breadth of House crow at Merewent 37.0 and 26.9 (Allan and Davies [1]). At Islamabad- Rawalpindi 37.5 and 26.4 mm (Habib [15]) and At Kharg Island 39.0 and 27.6 mm reported by Behrouzi-Rad [3]. Egg weight of House crow recorded in study area was 11.7 g. While in Merewent egg weighted 13.2 g (Allan and Davies [1]), Islamabad-Rawalpindi 12.8 g (Habib [15]) and on Kharag Island 12.6 g reported by (Behrouzi-Rad [3]).

5. Conclusions

It is concluded from our result that House crow do not favors to nest on man-made structures when trees fulfilling the demands of nesting. We also concluded from result that our research do not support predictions created on hypothesis of optimal clutch/ egg dimensions (Brockelman [6]).

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