

Full Length Research Paper

Comparative Study of Reproductive Biology of Moorhens Inhabiting Hokersar Wetland Kashmir

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Abstract

Comparative study of reproductive biology of common moorhen (*Gallinula chloropus*) and purple moorhen/purple swamp hen *Porphyrio porphyrio* was carried out during 2012 breeding season, in Hokersar wetland Kashmir. Nesting sites were chosen by common moorhen in thick emergent vegetation, dominated by *Typha* and *Phragmites* while as nesting sites of purple moorhen were dominated by *Butomus umbellatus*, *Saccharum spontaneum*, and *Sparganium ramosum*. Reed height in nesting sites of common moorhen at the time of nesting averaged 98.4 ± 9.4 cm and reed density 59 ± 4 while as purple moorhen preferred nesting sites with average reed height of 112.5 ± 7.1 cm and reed density 65 ± 3 . Mean clutch size was 8 and 4 in common and purple moorhen respectively. Mean egg dimensions also showed variation with 41.10 ± 1.94 mm \times 30.08 ± 2.11 mm in common and 52.91 ± 1.82 mm \times 35.76 ± 1.71 mm in purple moorhen. The egg volume and egg shape indices also varied with 19.88 ± 1.8 cm³ and 73.18 in common moorhen and 34.5 ± 3.6 cm³ and 67.58 in purple moorhen. The hatching, fledging and nesting success in common moorhen were 45%, 43% and 48% and in purple moorhen 53%, 55% and 57% respectively.

Key words: Nesting, Clutch, Hatching, Haigam, Reeds, Density

Introduction

The moorhens especially the common moorhen *Gallinula chloropus* and purple moorhen/swamp hen *Porphyrio porphyrio* are important members of the rail family and predominant species of the wetlands of the valley particularly Hokersar wetland during summer (Shah 1984). Various species have been recognized, based on minor differences, giving them worldwide distribution. There is no sexual dimorphism as both males and females have similar plumage but females are often smaller than males (Petrie 1983). Purple moorhen (*Porphyrio porphyrio*) a medium sized water bird (Ali, 1979) but larger than common moorhens and handsome, purplish-blue bird with long red legs and bald red forehead.

The aim of the present paper is to compare various reproductive parameters of common moorhen and purple moorhen analyzed from the data collected from the Hokersar wetland during 2012 breeding season.

Material and Methods

Study Area

The study was carried out at Hokersar wetland (34°06' N, 74°05' E) a Ramsar site. It lies 10 km west of Srinagar on Srinagar Baramullah highway (Figure 1). The wetland provides excellent wintering resort, cover and safe roosting and feeding grounds to a large number of migratory waterfowl as well as breeding and nesting grounds for diverse migratory and resident birds in summer. This wetland is mainly fed by Doodhganga watershed in Pir Panjal range of Himalayas. It has the dominant vegetation of *Typha angustata*, *Phragmites communis*, *Sparganium ramosum* *Butomus umbellatus* and *Saccharum spontaneum*.

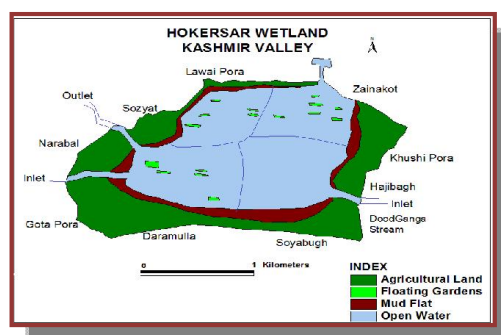


Fig. 1 Study site

Field procedures

Nests were searched systematically throughout the wetland. On finding a nest dimensions viz. diameter, depth and height above water were measured with the help of measuring tape. Egg mass and egg morphometry were taken by electronic balance and digital calipers respectively. Freshly laid eggs were marked with indelible marker pen in the order of their laying to calculate egg weight loss, incubation period and hatching period. Slender willow stakes flagged with strips of red cloth were used to mark nest locations so that nests could be relocated (Klett et.al 1998). To monitor outcome of nests, nests were visited thrice a week. A nest was defined as successful if there was at least hatching of one chick in the nest, the presence of piping hole on the egg made by the chick or by observing the behaviour of incubating bird. Incubation period was defined as the period since the laying of last egg of clutch until the hatching of first egg (Gill 1994). To calculate the average weight losses, eggs were weighed regularly with digital balance till they hatched. Freshly hatched chicks were weighed to the nearest gram and their beaks and tarsi measured with the help of vernier callipers. Egg volume was calculated as $V=0.51 \times L \times B^2$ and Shape index as $W/L \times 100$ (Hoyt, 1978).

Table 1. Egg Dimensions of Purple/Common Moorhens

Bird species	Egg parameter	Minimum value	Maximum value	Mean value	Number
Purple Moorhen/Common Moorhen	Weight(un-incubated)	28.2g/17.8g	31.6g/22.5g	29.65±1.17g/20.69±1.5g	30/ 30
	Weight (incubated)	24.8g/14g	25.2g/17g	25±0.15g/14.64± 0.9g	30/ 30
	Length	50.02mm/38.11	55.78mm/43.6	52.91±1.82mm/41.1±1.9mm	90/ 90
	Breadth	32.02mm/27.01	37.98mm/33.05	35.76±1.71mm/30.08±2.1m	90/ 90
	Volume	26.15cm ³ /14.18c m ³	41.03cm ³ /24.28c m ³	34.5±3.6cm ³ /19.88±1.8cm ³	90/ 90
	Shape Index	64.01/70.87	68.08/75.8	67.58/73.18	90/ 90

Results

Breeding season

The breeding season was initiated by pair formation and maintenance of territories in the first week of April in common moorhen and in 3rd week of April in purple moorhen when the air temperature varied from 21°C to 25°C and the reed height from 45cm to 60cm. It extended up to August during which common moorhen went for double brooding and raised two generations while as purple moorhen raised a single generation only.

Nest site, building and structure

Common moorhen chose nest sites in the areas which had dense growth of emergent vegetation dominated by *Typha angustata*, *Sparganium ramosum* and *Phragmites communis* while as nesting sites of purple moorhen were dominated by *Butomus umbellatus*, *Saccharum spontaneum*, and *Sparganium ramosum*. Average reed height in nesting sites of common moorhen was 98.4 ± 9.2 cm and reed density 59 ± 4 while as purple moorhen preferred nesting sites with average reed height of 112.5±7.1cm and reed density 65±3. The nests of purple moorhens were significantly larger than those of common moorhens with mean diameter of 19.8±4 and 16.5±3 respectively. The average nest depth of common moorhen nests was larger than those of purple hens with mean measurements of 7.6±2.5 and 4.8 ± 1.7 respectively.

Egg morphometry, Clutch size and Incubation

Eggs of both the species of moorhens were similar in shape and colour but showed variation in length, breadth and volume. Common moorhen eggs measured on an average $41.10 \pm 1.94\text{mm} \times 30.08 \pm 2.11\text{mm}$ and those of purple moorhen eggs $52.91 \pm 1.82\text{mm} \times 35.76 \pm 1.71\text{mm}$. The egg volume, shape indices and mean clutch size in purple and common moorhens were $34.5 \pm 3.6\text{cm}^3$, 67.58 and 4 and 19.88 ± 1.8 , 73.18 and 8 respectively. The average weight of common and purple moorhen eggs was $29.65 \pm 1.17\text{g}$ and $20.69 \pm 1.5\text{g}$ respectively.

There was variation in the incubation period of both the species with an average of 19.85 ± 1.5 days (range 18-22) and 23.2 ± 1.28 days (range 22-26) in common and purple moorhen.

Table 2. Hatching, Fledging and Nesting Success in Common/Purple Moorhens (Mayfield method)

Bird Species	Parameters	Exposure days	No. of eggs/ nestlings/ nests	No. of eggs/ nesting s/ nests failed	Daily survival	Success rate
Common moorhen	Hatching success	6755	526	238	0.96	0.45
	Fledging success	3650	288	88	0.97	0.43
	Nesting success	1826	72	42	0.97	0.48
Purple moorhen	Hatching success	8122	628	217	0.97	0.53
	Fledging success	5432	157	53	0.98	0.57
	Nesting success	2147	146	46	0.93	0.55

Hatching and Hatching success

The hatching in both the moorhen species was asynchronous and hatchlings were nidifugous but had marked variation in weight. Common moorhen chicks weighed on an average $19.6 \pm 2.8\text{g}$ and those of purple moorhen chicks $21.21 \pm 2.4\text{g}$. The hatching success during the study was 45% (Mayfield method) in case of moorhen while in purple moorhen it was 53% (Mayfield method). Fledging success and nesting success also varied with 55% and 57% and 43% and 48% in purple and common moorhen respectively. s respectively. During incubation eggs of common moorhen lost more weight than the eggs of purple moorhen. Egg weight loss was 17.7% in common moorhen and 15.6% in purple moorhen eggs.

Discussion

There was a single breeding season the duration of which in purple moorhen and common moorhen lasted for nearly four and five months respectively extending from April to August. During this period two generations were raised by Common moorhen and one generation by purple moorhen. Bates and Lowther (1952) also reported a single breeding season for moorhens from May to August but with the presence of eggs continuously from May till August and suggested that it can be due to double brooding. Shah (1984) also reported a single breeding season for moorhen extending from April to August. The nesting site varied greatly but it was mostly characterised by thick growth of *Typha angustata*, *Phragmites communis* in common moorhen and *Butomus umbellatus* and *Sparganium ramosum* in purple moorhen which provided adequate cover and protection to the eggs and nestlings from predators. Similar observations regarding nesting sites were recorded by Shah (1984). The nest dimension viz. diameter and depth varied between the nests of common moorhen and purple moorhen. The purple hens' nests were significantly larger while as common moorhens nests were significantly deeper. Different workers have reported that nest dimensions depends upon the species and have very specific relation to the clutch size (Fazili, 2014 and Fazili and Humera). Various workers have reported the different clutch size in purple moorhen: Manez (1997) 3-5 eggs / nest, Schenk (1993) 4-6 eggs and Moali and Isenmann (2000) 3-6 eggs. The clutch size during the present study varied from 2-5 eggs with a mean of 4. Which was lower than the clutch size of common moorhen in which average clutch size was 8 eggs. Anderson (1965) has reported average clutch size of 7.6 eggs in common moorhen. During present investigation average egg measurements of purple moorhen were $52.91 \pm 1.82\text{mm} \times 35.76 \pm 1.71\text{mm}$ while it was $41.10 \pm 1.94\text{mm} \times$

30.08 ± 2.11 m in moorhen. The smaller size of eggs can be because of the fact that common moorhen females are smaller than purple moorhen females. During the present study there appeared a gradual loss of 15.6% and 17.17% in egg weights of the two species during incubation. Shah (1984) reported a gradual loss of about 10.5% in the weight of eggs of moorhen during incubation. Fazili (2002) has also reported that eggs lose weight from 15.6 to 18.4% in different bird species. Common moorhen eggs lost more weight than purple moorhen eggs. Since weight loss depends on the evaporation rate and surface area; smaller eggs of common moorhen have large surface area per unit volume than the purple moorhen eggs. Hatching was asynchronous in both the cases. Lack (1968) also observed asynchronous hatching in moorhen and according to him this phenomenon is an adaptation to a variable food supply. The hatchlings of purple moorhen were larger than those of common moorhen chicks. The possible size variation can be attributed to species variation and variation in egg size as large eggs contain more yolk content to tender large chicks prior to hatching. The hatching success, fledging success and nesting success in purple moorhen was higher than common moorhen. It is because of the reason that purple moorhens preferred nesting sites with dense and tall vegetation where the effect of predation was low. Similar finding in relation to nesting sites have been reported by different workers in different bird species (Buckley and Buckley, 1980; Ludwig *et al* 1994, and Fazili, 2014).

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