

First breeding record of Purple Heron (*Ardea purpurea* Linnaeus, 1766) using *Eichhornia crassipes* Mart. vegetation: An important record for North Gujarat, India

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Abstract

Purple heron breeding biology was studied in 2022 and 2023 during breeding season in Sabarkantha district of North Gujarat, India. We record *Eichhornia crassipes* vegetation used for breeding which was not previously recorded widely. We have monitored nesting, egg laying and fledging stages of chicks. The shapes of nest were oval and greater external and internal diameter, smaller external and internal diameter, height and depth of nests were studied. During these two years 46 eggs were monitored and hatched eggs number and chicks surviving to fledging were 80.43% and 76.09% respectively. In addition, average chicks reached to fledging per nest in this region was 2.91.

Key words : Purple Heron, *Eichhornia crassipes*, Breeding, Chicks.

Purple heron (*Ardea purpurea* Linnaeus, 1766) is a extensive ranging bird from heron family, Ardeidae and breeds in Africa^{16,25}, Europe^{5,17} Asia^{14,17} and even in palearctic region⁶. They breed in various Indian parts like North India¹² and South India¹ is reported, but it lacks many information. The purple heron is usually solitary bird but some time in colonial when nesting¹⁵. In India, large number of heronries have been reported but records of purple heron nesting are very few^{10,22,24}. The distribution map of these species shows that it breeds all over the Gujarat state, India but there is not any major report²².

Purple heron is generally gregarious nesting bird and used to breeds in high trees, routinely nests up to 22 m from the ground, but also in shrubs or stalk or grasses²⁰. There are 1-4 nests that are common per tree. In case of reed-beds, the construction of nest is from reeds⁷. Recently, purple heron breeding has been documented but only one documentation is there regarding purple heron breeding using *Eichhornia crassipes* Mart². So here we prepared a paper regarding purple heron using of *Eichhornia crassipes* vegetation for breeding nest.

A nest building was done by both

sexes. Nests were often reused with addition to the structure or with additional lining of material. Clutch sizes were usually 3-5 (varies from 1-10). In case of more than five eggs, a nest might be shared by two female bird. Nestling were semi-altricial and nidicolous, cared for and fed by both parents⁷.

Waterbirds breeding success is depend on food availability or food reservoir, predatory pressure and colony⁸. So for species which depend on aquatic ecosystem if there is change in environmental quality it indicate instantly²⁶.

The aim of this study is to provide direction to conservation attempt.

Study area

North Gujarat is the northern area of Gujarat state including Sabarkantha, Banaskantha, Gandhinagar, Aravalli, Mehsana and Patan districts. Purple herons nesting was made at Hijadiya pond of Sabarkantha district of North Gujarat, India. The pond is situated near the village of Ilol on Ilol-Himatnagar road (Fig. 1). There were not any other major water bodies found near this area. The area of pond is 4.09 ha. The Northern edge of pond is upper part while southern edge is slightly deeper in depth. The pond was covered with floating aquatic vegetation *Eichhornia crassipes* (Local name- Water hyacinth).

In search of wetland birds nesting, we visited several regions of north Gujarat. During our visit, we saw nesting of purple heron in Sabarkantha district in 2021 and hence we

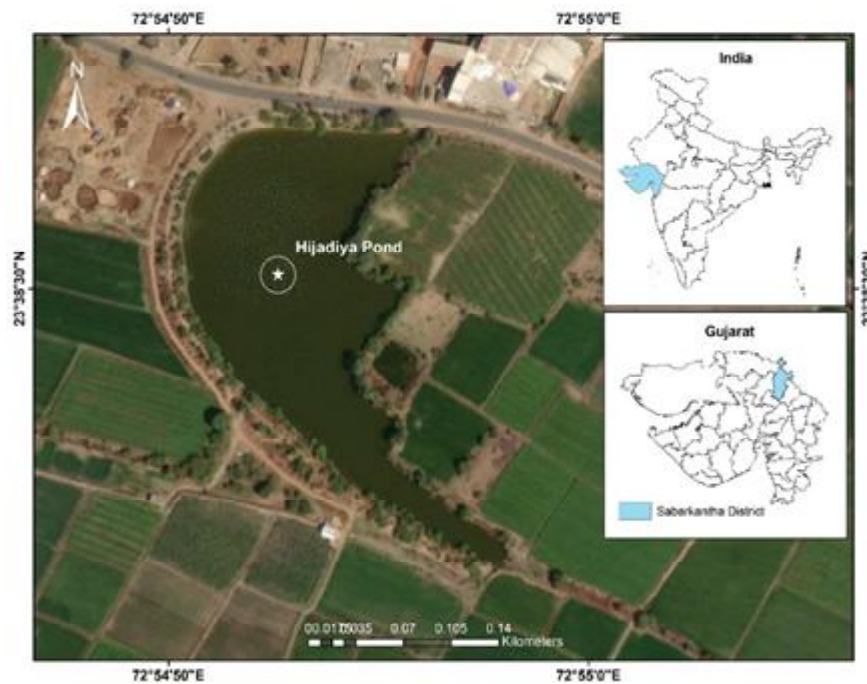


Fig. 1. Map.1 Location of the Hijadiya Pond, Sabarkantha, North Gujarat, India.

closely observed for two consecutive years 2022-2023. The survey was carried out during February 2022 to June 2022 and February 2023 to June 2023. They constructed a total of six nests in 2022 and following year same location six nests were also found. First Nest was built in the second week of February. Nests were counted and given a tag. In total, 12 nests were accessed.

For the beginning of the nest site, nests and the material used for it were persistent keep under observation at different intervals (2, 3, 5, 7 and 9 days). The nest content was recorded and monitored in each visit. We measured outer greater diameter, inner greater diameter, outer lesser diameter, inner lesser diameter, height of nest, height of vegetation, nest height from water surface and water depth were studied.

Newly incubated and flossy birds who cannot move in periphery and up to 10-12 days old are defined as nestling while loss of downy feathers and motive power around the nests and nearest branches and up to 12-25 days but not able to fly are defined as post nestlings. At the end, after 23-25 days nestlings can fly

and depart the nests called the fledging stage. To evaluate success of breeding rate and production; number of nests, eggs, nestlings and post-nestlings were calculated. Mean fledged chicks⁴ and mean breeding rate²¹ were also calculated. The statistics were performed using SPSS¹⁹. The values of means are in \pm SD.

Nesting :

All six nests in 2022 and six nests in 2023 were built on *Eichhornia crassipes* (Water hyacinth) during breeding season. The nest material contained water hyacinth and dry thorny twigs. The nests of this species are generally constructed by *Phragmites* or *Typha* stems and built on a flattened site in dense reed beds, rushes or papyrus¹¹. Twig nests were also built in thickest in Asia^{3,11}. So, selecting nesting sites on water hyacinth is totally new records for north Gujarat (Fig. 2). The construction of nests was at a distance of 1.5-2.0 m from each other. Mean height of vegetation was 0.80 ± 0.20 m (ranges from 0.05-1.00) and depth of the water was 8.91 ± 0.30 m (ranges from 8.50-9.30), whereas nests height from water surface was 0.65 ± 0.03 m (ranges from 0.70-0.61).

Table-1. During breeding season Mean \pm SD of nest parameters of purple heron

Parameter	Means \pm SD	Min.-Max.
External greater diameter of nests (cm)	76.16 \pm 10.62	60-90
Internal greater diameter of nests (cm)	26.83 \pm 5.77	17-32
External lesser diameter of nests (cm)	65.16 \pm 8.32	53-79
Internal lesser diameter of nests (cm)	24.83 \pm 4.26	17-28
External height of nest (cm)	35.16 \pm 9.90	20-51
Internal height of nest (cm)	12.33 \pm 4.54	05-19
Height of vegetation (m)	0.80 \pm 0.20	0.50-1.00
Height of nest from water surface (m)	0.65 \pm 0.03	0.70-0.61
Depth of water (m)	8.91 \pm 0.30	8.50-9.30

Table-2. Purple heron nests and clutch sizes in different stages of breeding success

Clutch size	Frequency (nest number)	Hatched eggs	Eggs reached nestling stage	Eggs reached post-nestling stage	Fledged chicks (Frequency): mean reared per clutch
3	33.3%(4)	83.33%(10)	75.00%(9)	75.00%(9)	9 (25.71%): 2.25
4	50%(6)	87.50%(21)	83.33%(20)	83.33%(20)	20 (57.15%): 3.33
5	16.7%(2)	60.00%(6)	60.00%(6)	60.00%(6)	6 (17.14%): 3
Total breeding success					
100%(12)		80.43% (37)	76.09%(35)	76.09%(35)	35 (100%): 2.91

Nestling :

Fig. 2. Young ones of the purple heron being guarded by parents.

First egg hatched in first week of April and it continue until first week of May, fledgling could fly nearby in last week of May and all young one left the nests till mid-June (13-15). From the first days of hatching, nestling had a long plume from crown to extend towards below part of eye and upto eyes. The colour of the body was greyish white, colour of eyes was yellow iris with black pupil, with yellow

lower mandible and dark upper mandibles (Fig. 3). The colour of legs was olive in colour. Hatching did not take all at once, from the total nests around 80% nest having unidentical intervals of time period of 3 to 5 days. From hatching to fledging it took around seven to eight weeks.

Breeding success :

In this study, out of 46 eggs (from 12 nests) 37 eggs hatched and 35 fledged. Breeding success was 76.09%. The clutch size of 4 eggs had highest success ratio of 83.33% followed by 3 eggs (75.00%). While eggs reached in nestling stage and post nestling stages observed uniform. The number of eggs reached at nestling stage was higher in clutch size of 4 eggs which was 83.33% and lowest was in clutch size of 5 eggs which was 60.00%.

In this study, 12 nests were counted and there was not any previous documentation regarding these species nesting in this area. Purple heron starts building of nest at breeding sites begins from March. This is the same time as observed in the Anand district of Gujarat state².

The nests were constructed on



Fig. 3. Young ones of the purple heron.

Eichhornia crassipes vegetation is one of the key major changes observed for these species. There are several reports for nesting on trees^{7,10,11,12,16,18,22} but it have different predatory pressure from the bird of prey, snakes, mice in the urban and natural habitats^{9,13,27}. The predatory pressure was comparatively low in this type of vegetation. So, it may be prime reason for choosing this type of vegetation.

This research revealed that breeding success rate from the time of hatchlings to fledging was 57.15% for the nests which was

built in early march who had 4 eggs. The success rate of fledging in nests was 2.91 per nest. This outcome was 76.09% from initial eggs. In comparison, the rate of breeding colony of purple heron in the Lake Chivero of Zimbabwe was 0.21 and 1.10 chicks per nest for nests in bulrushes and reeds²³. In Dakhla-Algeria the fledging success reported was¹⁷ 2.5.

Breeding success is directly linked with availability of food supply. Sometimes brood of three lost no nestlings if good source of food supply and broods of four and five lost more if

no food is available nearby. In this condition, due to food shortage the smallest young ones were dying first⁷. The probable reason for the higher rate of breeding success of purple heron in *Eichhornia crassipes* vegetation was higher amount of food supply and favourable weather condition (without rainy days).

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Data availability statement:

All data underlying the results are available as part of the article and no additional source data are required.

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