Monthly, Seasonal Fluctuations and Breeding Season Studies of Cattle Egret, <i>Bubulcus ibis</i> (L.) at Tahta District, Sohag Governorate

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ABSTRACT

The highest value of cattle egret birds were in fields nearby water channels during 2014/2015 and 2015/2016, while the lowest value was recorded in fields nearby buildings, field crops and trees. However, the highest value of abundance of cattle egret were in June, July, August 2014 and August 2015 and January 2015 and 2016, February 2015 and 2016, September 2014 and 2015 and December 2014 and 2015. The highest value of cattle egret in Tahta district was in spring 2014 and 2015 and winter 2015 and 2016. While, the lowest value was recorded in autumn 2014 and 2015. The breeding period of cattle egret was reported to be from January to August. The egg laying pattern of the cattle egret revealed that the time interval between the two successive laying's was approximately 30-36 hours. Cattle egret lays five clutches which extend from 3 to 26 January to 5/August, 2016 breeding season, respectively. Clutch size was recorded to be 1 to 5 eggs, 3 being the commonest and exceptionally 1 during the study period with 60.00% of nests with three eggs, 15.00% with four, 10.00% with two and five eggs and remaining 5.00% with one egg. Minimum of incubation period of Cattle egret birds was (19 days). The maximum incubation period was 22 days during breeding season. Hatchability of egrets differed according to clutch; its value was 70.58% at the first clutch, 73.68% at the second clutch, 72.22% at the third clutch, 69.69% at the fourth clutch, respectively. The lowest percentage of hatching was recorded in fifth clutch (65.52%), during breeding season 2016.

**Keywords**: population, nearby, trees, breeding, period, clutch, egg, hatching, cattle egret, birds.

INTRODUCTION

Birds are important animal group that keep systems in balance; pollinate plants, disperse seeds, scavenge carcasses and recycle nutrients back into the earth. Cattle egrets are one of the common birds seen around human settlement, in rural as well as in urban set up and seem to be not much bothered by human activities. (Joshi and Shrivastava, 2012). The cattle egret, <i>Bubulcus ibis</i> (L.) is thought to be one of the serious beneficial birds of agricultural areas in Egypt. The agricultural laws set to protect this bird species as possible as we can. It is understandable that this bird species is beneficial to cattle, as it walks among grazing cattle and sits on their backs in order to catch harmful insects and other small animals. It even follows ploughs running in land preparation to pick insect larvae and pupae, in addition to small animals particularly rats and slugs (Soliman, 1999). The present work was done in the farms of Tahta district at Sohag governorate in order to study of monthly, seasonal fluctuations and breeding season of Cattle egret, <i>Bubulcus ibis</i> (L.).

MATERIALS AND METHODS

Study area:
The present work was conducted at Sohag governorate, which occupies the Upper Egypt, about 495 Km. South of Cairo. Sohag governorate boarded by Assiut in the North, in the South by Qena, in the East by Red Sea governorate, and in the West by New Valley governorate. Tahta district was located at the West of the Nile River.

Population fluctuation of cattle egret, <i>B. ibis ibis</i> (L.):
The research was carried out at Tahta district, Sohag governorate at four different habitats nearby (buildings, field crops, trees and water channels), during two successive years, from April, 2014 to March, 2016 (2014/2015 and 2015/2016). In these trails, area size is two feddans inside the chosen cultivated habitat, then number of cattle egret was counted in each habitat, by using the method of Redinger and Libay (1979) as a plot equivalent two feddans from the determined cultivated area in each habitat. The identification and counts of birds were achieved by using field glass (binoculars) from rising position, which gave clear sighted vision of the plots. This work has been accomplished twice daily, the first at sunrise and second at sun-set during One hour for four days monthly. Bird classification was carried out by (Sibley and Monoroe 1990) under review by the checklist committee of the American Ornithologists Union (A. O. U.) were followed in bird classification. The population fluctuations of cattle egret was studied monthly and seasonal daytime at four different habitats were mentioned above to find the relationship between population density of cattle egret and different seasons of year.

**Biological study:**

**Biological aspects of Cattle egret, B. ibis ibis (L.):**

Some biological aspects of the cattle egret (<i>B. ibis ibis</i>) were studied at Sohag governorate by chose 20 nests randomly during 2016 breeding season. These nests were investigated to record the available information about biological aspects such as; egg laying duration, clutch size, total number of eggs, and incubation period/day. At the same time percentage of hatchability were estimated for each clutch. The investigation nests were carried out daily during the breeding season from January to August (2016). Egg laying proceeded after the nest was constructed by the paired partners and during this period. Nests were checked during the early morning, in order to reduce disturbance during incubation and avoid exposing of the eggs to excessive solar radiation. Nests were checked once every two days during the laying period and each egg was individually marked (Holocomb, 1974). Clutch size is the number of eggs laid in a single nest. Moreover, the time elapsed between the last egg laying and hatching of it was determined according to (Swanberg, 1959) to calculate the incubation period. On the other hand, the hatchability was defined as the ratio of the number of nestlings hatched to the number of eggs laid (Zduniak and Kuczynski 2003).

**Statistical analysis:**

Data obtained were statistically analyzed using a randomized complete block design. Means were compared according to Duncan's Multiple Range test, at 0.05 level of probability.

RESULTS AND DISCUSSION

Monthly of Population Fluctuation of Cattle egret, <i>B. ibis ibis</i> (L.):

Results in table (1) showed the effect of habitats types and daytime on the population density of Cattle egret, <i>B. ibis ibis</i> at Tahta district, Sohag governorate from 2014 to 2016.
The highest value of Cattle egret were in fields nearby water canals with means (8.83 and 5.08 individuals) during 2014/2015 and 2015/2016, with insignificant differences between them. The lowest value of Cattle egret were recorded in fields nearby buildings with means (0.83 and 1.79 individuals), field crops with means (1.63 and 1.46 individuals) and trees with means (1.17 and 1.67 individuals) during 2014/2015 and 2015/2016, respectively.

The monthly population abundance of Cattle egret birds in Tahta district during 2014/2015 and 2015/2016. Data in table (1) revealed that, the highest value of abundance during March 2015 and April 2014 with means (14.75 and 10.50 individuals), followed by March 2016 and April 2015 with mean (8.25 and 7.25individuals), also, May 2014 and May 2015 with means (4.75 and 5.63 individuals). Moderate value of abundance was recorded in June and July 2015 with means (2.75 and 2.25 individuals). While, the lowest value of population abundance of Cattle egret were in June, July, August 2014 and August 2015 with means (1.88, 1.50, 1.13 and 1.13 individuals), January 2015 and 2016 with means (0.88 and 0.75 individuals), February 2015 and 2016 with means (1.13 and 1.00 individuals), September 2014 and 2015 (0.50 and 0.63 individuals) and December 2014 and 2015 (0.38 and 0.38 individuals). The results in the same Tables revealed that no individuals of cattle egret recorded in two months (October 2014/2015 and November 2014/ 2015, respectively. Generally, the yearly population trend of cattle egret indicated the presence of one major peak of abundance March and April. After wards, the population density trends to decrease gradually during May, June, July and August (table, 1). El – Danasory (2002) cleared that the highest population of Cattle egret was recorded from old land than new reclaimed land during 1998 than 1999 also revealed that the means of population was reached its maximum during Summer 1998 (37.55 bird ) and Autumn 1998 (24.5 bird). Barakat -Noura (2016) cleared that, the highest values of Cattle egret at Tanta district were in field crops and water canals with average (35 and 37 individuals) in November 2012 and January 2013 at sun-rise and sun-set, while the lowest values were in buildings, field crops, trees and water canals with average (1 individual) at sun-rise and sun-set in, October, December 2012, 2013 and April 2014.

Table 1. Population fluctuation of Cattle egret, *Bubulcus ibis ibis* (L.) in Tahta district at Sohag governorate.

<table>
<thead>
<tr>
<th>Month</th>
<th>Different habitats</th>
<th>2014/2015</th>
<th>2015/2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B= Buildings</td>
<td>F= Field crops</td>
<td>T= Trees</td>
</tr>
<tr>
<td>Apr.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>May</td>
<td>3.50</td>
<td>2.00</td>
<td>6.50</td>
</tr>
<tr>
<td>Jun.</td>
<td>2.00</td>
<td>1.50</td>
<td>0.50</td>
</tr>
<tr>
<td>Jul.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Aug.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Sep.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Oct.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Nov.</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Dec.</td>
<td>0.50</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Jan.</td>
<td>0.00</td>
<td>0.00</td>
<td>3.50</td>
</tr>
<tr>
<td>Feb.</td>
<td>0.50</td>
<td>0.00</td>
<td>0.40</td>
</tr>
<tr>
<td>Mar.</td>
<td>3.50</td>
<td>15.00</td>
<td>6.50</td>
</tr>
<tr>
<td>Mean</td>
<td>1.13b</td>
<td>6.63b</td>
<td>17.76b</td>
</tr>
</tbody>
</table>

* Means have the same are not significantly differed by using Duncan’s analysis.

Table 2. Seasonal fluctuation of Cattle egret, *B. ibis ibis* (L.) at Tahta district, Sohag governorate from 2014 to 2016.

<table>
<thead>
<tr>
<th>Year</th>
<th>Different habitats</th>
<th>2014/2015</th>
<th>2015/2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B= Buildings</td>
<td>F= Field crops</td>
<td>T= Trees</td>
</tr>
<tr>
<td>Spring</td>
<td>1.83</td>
<td>1.17</td>
<td>2.33</td>
</tr>
<tr>
<td>Summer</td>
<td>0.00</td>
<td>0.00</td>
<td>0.17</td>
</tr>
<tr>
<td>Autumn</td>
<td>0.37</td>
<td>0.33</td>
<td>0.00</td>
</tr>
<tr>
<td>Winter</td>
<td>1.33</td>
<td>5.00</td>
<td>2.17</td>
</tr>
<tr>
<td>Mean</td>
<td>1.63b</td>
<td>1.63b</td>
<td>1.17b</td>
</tr>
</tbody>
</table>

* Means have the same are not significantly differed by using Duncan’s analysis.

Biological aspects associated with Cattle egret, *B. ibis ibis* (L.):

The process of reproduction or breeding is an ineluctable prerequisite for the propagation of any bird species. The breeding phase is intimately tied to the distribution and abundance of food resources in their environment. The adequate timing of reproduction and the breeding success are two fundamental attributes of breeding. One of the dominant bird species Cattle egret, *B. ibis ibis* was chosen to study some biological aspects under field condition of Sohag governorate. It is the non-breeding adult has mainly white plumage, a yellow bill and greyish-yellow legs. The sexes are similar, but the male is marginally larger and has slightly longer breeding plumes than the female; juvenile birds lack cultured plumes and have a black bill.
Cattle egret birds preferred to making of nests in colonies on trees nearby the aquatic environment, because of the abundance of food and the protection of its youngs. Cattle egrets preferred farmlands, as well as inhabited marshes (Nelfa et al., 2015). The biological studies on Cattle egret had been conducted during 2016 breeding season at Sohag governorate.

Breeding season:
In the area under inquisition (Upper Egypt), the breeding period of Cattle egrets was reported to be from January to August, 2016. Barakat -Noura (2016) noted the breeding seasons to start chiefly during January to July in North Egypt. This may be due to variations in temperature and humidity in the South of Egypt compared to the North of Egypt. The first preference of nesting tree was Acacia nilotica. Nests designed by natural selection to help parent meet the needs of it youngs. In Egypt, Soliman (1999) revealed that the breeding season of Cattle egret started during the period from March to August at Kafr El-Sheikh Governorate.

Nests and eggs-laid:
In the area under inquisition, the nesting colonies of Cattle egrets were recorded to be exclusively nonspecific with only Cattle egrets nesting on the nesting tree. Egg brood proceeded after the nest was constructed by the paired partners (male and female) during this period, daily observation pertaining to the egg laying pattern of the Cattle egret revealed that the time interval between the two successive brood was approximately 30-36 hours. Range of time of onset of egg laying in the study area is depicted in the Table (3).

Table 3. Time of onset of egg-brood in Cattle egrets at five clutches in the study area during 2016 breeding season.

<table>
<thead>
<tr>
<th>Clutches</th>
<th>Time of onset of egg-laying</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>First week of January, 2016</td>
</tr>
<tr>
<td>Second</td>
<td>Last week of February, 2016</td>
</tr>
<tr>
<td>Third</td>
<td>Second week of April, 2016</td>
</tr>
<tr>
<td>Fourth</td>
<td>First week of June, 2016</td>
</tr>
<tr>
<td>Fifth</td>
<td>Third week of July, 2016</td>
</tr>
</tbody>
</table>

Egg brood duration:
Data in Table (4) show that Cattle egret lays five clutches which extend from 3 to 26 January, 28 February to 21/March, 16/ April to 7/May, 2 to 22/June and 17/July to 5/August, 2016 breeding season, for the five successive clutches, respectively. The mean of number of inspected nests and eggs were (20 nests with 68 eggs) during breeding season 2016.

Table 4. Number of inspected nests, total eggs and mean of Cattle egret, Bubulcus ibis ibis the study area during 2016 breeding season.

<table>
<thead>
<tr>
<th>Clutches</th>
<th>Time of onset of egg-laying</th>
<th>No. of inspected nests</th>
<th>Total No. of eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>3-26 Jan/2016</td>
<td>20</td>
<td>68ab</td>
</tr>
<tr>
<td>Second</td>
<td>28/Feb.-21/Mar./2016</td>
<td>20</td>
<td>76a</td>
</tr>
<tr>
<td>Third</td>
<td>16/Apr.-7/May/2016</td>
<td>20</td>
<td>72a</td>
</tr>
<tr>
<td>Fourth</td>
<td>2-22/June/2016</td>
<td>20</td>
<td>66ab</td>
</tr>
<tr>
<td>Fifth</td>
<td>17/Jul.- 5/Aug/2016</td>
<td>20</td>
<td>58b</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>20</td>
<td>66</td>
</tr>
</tbody>
</table>

* Means have the same are not significantly differed by using Duncan's analysis.

Our results agree with that obtained by some authors, Soliman (1999) mentioned that the Cattle egrets lays four clutches extended from 25 March to 9 April, from 7 to 17 May, from 20 June to 1 July and from 1 to 9 August. El-Danasory (2002) showed that Cattle egret lays four successive clutches which extend from 8 to 20 April, from 26 May to 6 June, from 8 to 16 July, and from 14 to 20 Augusts, respectively. Barakat -Noura(2016) revealed that some biological aspects of Cattle egret, Bubulcus ibis ibis under field condition of Gharbia governorate. She found that the time interval between the two successive laying was approximately 24-28 hours. Cattle egret layed four successive clutches which extended from (1 to 27 January, 4 to 31 March, 26 April to 12 May, and 7 to 24 June), respectively.

Clutch size:
Clutch size variation can originate from genetic variation (Van Noordwijk et al., 1980) or phenotypic response to environmental conditions (Murphy, 1983). The range of the clutch size was recorded to be 1 to 5 eggs, 3 being the commonest and exception 1 during the study period with 60.00% of nests with three eggs, 15.00% with four, 10.00% with two and five eggs and remaining 5.00% with one egg. Nests and numbers of eggs – laid were monitored during the breeding seasons of Cattle egret, Bubulcus ibis ibis during 2016. The results showed that, the lowest mean number of eggs/ nest – laid was observed during fifth clutch with 2.90 eggs, following by first and forth clutches with means of number eggs/ nest-laid were (3.40 and 3.30 eggs). While, the highest mean number of eggs/ nest – laid was recorded during second clutch (3.80 eggs), following by Third clutch (3.60 eggs), respectively. El-Danasory (2002) revealed that, clutch size of Cattle egrets was a variable among four clutches as 3.5, 3.4, 2.9 and 2.75 eggs 1st, 2nd, 3rd and 4th respectively. Barakat -Noura(2016) showed the clutch size was variable among four clutches as 2.6, 2.8, 2.6, and 2.6 eggs, in the first, second, third and fourth clutches, respectively.

Table 5. Number of inspected nests, Av.No. of clutch size egg/nest and mean of Cattle egret, Bubulcus ibis ibis in the study area during 2016 season.

<table>
<thead>
<tr>
<th>Clutches</th>
<th>Time of onset of egg-laying</th>
<th>No. of inspected nests</th>
<th>Av. No. of clutch size egg/nest*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>3-26 Jan/2016</td>
<td>20</td>
<td>3.40a</td>
</tr>
<tr>
<td>Second</td>
<td>28/Feb.-21/Mar./2016</td>
<td>20</td>
<td>3.80a</td>
</tr>
<tr>
<td>Third</td>
<td>16/Apr.-7/May/2016</td>
<td>20</td>
<td>3.60a</td>
</tr>
<tr>
<td>Fourth</td>
<td>2-22/June/2016</td>
<td>20</td>
<td>3.30a</td>
</tr>
<tr>
<td>Fifth</td>
<td>17/Jul.- 5/Aug/2016</td>
<td>20</td>
<td>2.90a</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>20</td>
<td>3.40</td>
</tr>
</tbody>
</table>

* Means have the same are not significantly differed by using Duncan’s analysis.

Incubation period:
The incubation period started immediately after the laying of eggs in the present study. Daily observation pertaining to the egg incubation process pattern of the female of Cattle egret birds revealed that it is a warm temperature must be maintained to promote embryo development. And the daily observation reported that females were incubators of eggs during this period. Data in Table (6) show The minimum of incubation period of Cattle egret birds was (19 days). Maximum incubation period was (22 days) during breeding season 2016. This reporting was not significantly different from that of Soliman (1999) stated that the incubation period did not considerably differ from one clutch to another as it averaged 22.1, 22.0, 21.9 and 21.7 days for the four clutches respectively. El-Danasory (2002) reported that, incubation period of Cattle egrets differed according to temperature degree it decreased when temperature increased as it averaged 23.73, 23.33, 23.07 and 21.78 days for the four clutches respectively. Kour and Sahi (2013) recorded the average of incubation period ranging from 21-23 days.
Barakat -Noura(2016) recorded that the Means of incubation period of Cattle egret was 23.22.5, 22.05 and 19.2 day for the fourth clutch, respectively.

Table 6. Number of inspected nests, incubation period/day and mean of Cattle egret, Bubulcus ibis ibis in the study area during 2016 season.

<table>
<thead>
<tr>
<th>Clutches</th>
<th>Time of onset of egg-laying</th>
<th>No. of inspected nests</th>
<th>Incubation period/day*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>3-26Jan/2016</td>
<td>20</td>
<td>70.5%ab</td>
</tr>
<tr>
<td>Second</td>
<td>28-Feb.-21/Mar/2016</td>
<td>20</td>
<td>72.22%</td>
</tr>
<tr>
<td>Third</td>
<td>16/Apr.-7/May/2016</td>
<td>20</td>
<td>69.69%</td>
</tr>
<tr>
<td>Fourth</td>
<td>2-22Jun/2016</td>
<td>20</td>
<td>64.28%</td>
</tr>
<tr>
<td>Fifth</td>
<td>17/Jul.-5/Aug/2016</td>
<td>20</td>
<td>72.22%</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>20</td>
<td>70.58%</td>
</tr>
</tbody>
</table>

* Means have the same are not significantly differed by using Duncan’s analysis.

Hatchability:

After completion the embryo growth in eggs starting of hatching stage. Previous studies indicate that there the relationship between ambient temperature and egg viability could contribute to both seasonal and latitudinal trends in clutch size, hatching success and hatching asynchrony, (Stoleson and Beissinger, 1999).

Data in Table (7) show the percentage of hatching of Cattle egrets during breeding season 2016. The hatchability of Cattle egrets differed according to clutch; its value was 70.5% at the first clutch, 73.68% at the second clutch, 69.69% at the fourth clutch. While the lowest percentage of hatching was recoded in fifth clutch (65.52%), during season 2016, respectively. Barakat-Noura(2016) studied the hatchability of Cattle egrets differ according to clutch, its value was 50% at the first clutch and 73.68% at the third clutch and 76.92% at the fourth clutch.

Table 7. Number of inspected nests, hatching(%) and mean of Cattle egret, Bubulcus ibis ibis in the study area during 2016 season.

<table>
<thead>
<tr>
<th>Clutches</th>
<th>Time of onset of egg-laying</th>
<th>No. of inspected nests</th>
<th>Hatching (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>3-26Jan/2016</td>
<td>20</td>
<td>70.5%ab</td>
</tr>
<tr>
<td>Second</td>
<td>28-Feb.-21/Mar/2016</td>
<td>20</td>
<td>73.68%</td>
</tr>
<tr>
<td>Third</td>
<td>16/ Apr.-7/May/2016</td>
<td>20</td>
<td>69.69%</td>
</tr>
<tr>
<td>Fourth</td>
<td>2-22Jun/2016</td>
<td>20</td>
<td>65.52%</td>
</tr>
<tr>
<td>Fifth</td>
<td>17/Jul.-5/Aug/2016</td>
<td>20</td>
<td>72.22a</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>20</td>
<td>70.58%</td>
</tr>
</tbody>
</table>

* Means have the same are not significantly differed by using Duncan’s analysis.

REFERENCES


 Bachelor of Science in Environmental Science - Eco (B. ibis ibis L.)

Mohamad Emad Sedki Badr and Mohamed Ali Omran


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