Title	Clutch size and breeding success of Turdoides gularis (Blyth, 1855) in Mandalay Environs
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Clutch Size and Breeding Success of *Turdoides gularis* Blyth, 1855 in Mandalay Environs

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Abstract

Clutch size and breeding success of *Turdoides gularis* were evaluated during breeding season of March to July 2008 in Mandalay environs. A total of 18 nests and 62 eggs were found in March to June, but none in July. Nest plants include three species of thorn scrubs, *Citrus acida*(Shauk), *Acacia chundra*(Sha) and *Ziziphus mauritiana*(Zi). Mean nest height was 3.3 m (range = 1.37-4.45, n = 18). Nest building lasts 3-4 days. Eggs are plain turquoise greenish blue in colour. Average length of an egg is 2.2 cm and average width is 1.85 cm. Mean clutch size was 3.4±1.2 (range = 2–6, n = 18). Average incubation period is 12-14 days. The average time required to become fledglings is 16 days after hatching. Among the recorded 62 eggs, 53 eggs hatched, 2 eggs unhatched, 7 eggs and 2 nestlings were lost and 51 become fledged successfully. Hatching success is 85.48 %, fledging success 96.22 % and breeding success 82.25 %. Average mortality rate is 17.74 %. *T. gularis* exhibits parental care.

Key Words : Clutch size , breeding success , nests, *Turdoides gularis*

Introduction

White-throated babbler, *T. gularis* Blyth, 1855 is 25.4cm, including a tail of 13.9cm, black lores, and white throat contrasting with dark rufous-buff underparts distinctive. Upperparts light olive-brown, darker and tinged rufescent on head, and streaked with black on crown and mantle. (King, 1975).

T. gularis is a typical bird of bungalow compounds in the dry city of Mandalay; the birds go about in small parties, hop about with the tail held at various angles, hunting for insects and turning over the fallen leaves. In the semi-arid plains and uplands of the dry zone, where cultivated fields alternate with waste lands dotted with thorn scrub, their real habitat is in the thorn hedges of the field boundaries; they rove from hedge to hedge, from thorn bush to thorn bush in search of food and can be seen flying over the open spaces between them (Smythies, 2001).

The clutch size is the number of eggs a bird lay in one set. Average clutch sizes range from 3 to 12 among species of waterfowl and from 2 to 23 among species of gallinaceous birds (Lack, 1968). Clutch sizes can also vary within a single species. Some of those variations reflect genetic differences between individuals, but age, food availability and season also affect on how many eggs a female lays (cited by Boag and Noordwijk, 1987).

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The breeding season is from early April to mid-June. They made a nest in the reeds or in the kaing grass or else it make a larger and more untidy nest of grass and reed blades in a low bush or thicket of grass. The eggs, 3 or 4 in number, are bright deep blue (Smythies, 2001).

Birds lay from 1 to about 20 eggs per clutch. A single egg is characteristic of some penguins and albatrosses, the California condor, and cliff dwelling alcids. In many species, clutch size tends to increase with latitude, that is tropical birds lay fewer eggs than their northern relatives, but some species (most sea birds, shorebirds and pigeons) lay a constant number regardless of their geographic range. Two-and three-egg clutches are common to many birds in the tropics and subtropics, whereas the same or closely related species lay double or triple that number in more northern latitudes. Thus clutch size is correlated with day length, but this may not be the critical factor. Clutch size is also correlated with the available food supply, the critical determining factor in northern latitudes (Wallace, 1963).

Egg-laying normally ceases once the bird completes the clutch size characteristics of her species. Then next phase of her reproductive activity, incubation, which is subsequently followed by broodiness, the care of the young chick occur (King and Mcleuand, 1979).

The incubation period is elapsed time between the laying of the last egg in a clutch and the hatching of that egg when all the eggs hatch (Nice, 1954; cited by Tyne and Berger, 1968).

Many birds begin to incubate with the laying of the penultimate egg, others with the laying of the last egg. Among different birds the incubation period varies from a minimum of about 11 days to almost 12 weeks (Walkinshaw, 1958; cited by Tyne and Berger, 1968).

The incubatory period is correlated to some extent with size, the larger eggs generally requiring longer hatching. But more fundamental is the stage of development of the young at hatching, the precocial bird usually requiring longer period for incubation. At the end of the period of incubation fertile eggs with live embryos hatch, or give birth to young; unhatched eggs may be infertile or contain embryos that died at some stage of development (Wallace, 1963).

Birds typically do not distribute their nest randomly among habitats, and it is generally assumed that non-random placement results from natural selection (Southwood 1977, cited by Guyn, 2000). Since reproductive success strongly influences fitness, natural selection should favor nest choices that minimize reproductive failure (Martin, 1993, cited by Guyn, 2000).The objectives of this research are

-to determine the clutch size of *Turdoides gularis*

-to evaluate the breeding success of *T. gularis*

Materials and Methods

Field work was carried out from March to June, 2008 at Mandalay environs including Mandalay University Campus.

Nest searching was conducted at least 3 days per week with the help of local bird catchers. Eggs were taken from nest after noting their numbers. Length, width and weight of each egg were measured.

Nest shape, nest materials and nest height were noted and recorded. Eighteen nests of *Turdoides gularis* were observed in this research work. One nest was observed in detail. The number of eggs in each nest, the number of hatched eggs, unhatched eggs, lost eggs, broken eggs and hatchlings, fledgling and lost of young were recorded. Then, eggs laid, incubation period, hatching date and nesting period and fledged successfully to forage are noted.

The hatching success, fledging success and breeding success were calculated following Mayfield method (1975).

Results

A total of 18 nests and 62 eggs of *Turdoides gularis* were recorded from March to July 2008. Nests are cup-shaped, made of grass kaing grass and lined with grass stem, twigs and creepers. The measurements are 3.093-8.025 cm in diameter, 3.01-4.04 cm in width and 1.32 – 4.45 m in height above base of plant. Nest building was performed by both male and female since both sexes were seen carrying nest building materials and took 3-4 days.

Eggs and Clutch Size

Eggs are plain turquoise greenish blue, oval shape, with a mean length of 2.2 cm and a mean width of 1.85 cm. Mean egg weight was 3.496 g. Clutch size varies from 2 to 6 with a mean of 3.4 (Table 1).

Incubation and Hatching

One egg is laid daily, up to six being laid during one breeding cycle. Incubation period is 12-14 days; both sexes taking part alternately in this act.

A nest of clutch size 6 on the branch of *Ziziphus mauritiana* (Zi), was located in Mandalay University Campus, U Pon Nya Road (Plate 1 A.B). Nest height was 4.14 m. Nest building initiates at 14 May 2008. Egg laying initiates at 20 May, 2008. Incubation initiates at 25 May, 2008. Hatching date was 14th days of 7 June, 2008. Two eggs hatched, one in morning and another in afternoon. At hatching, the youngs are altricial, bodies naked, only covered with reddish brown skin. Eyelids completely closed and immobile (Plate 1. C).

2 Days Old (8.6.08)

Bill was pale yellow. Feathers sparsely grow on capital, humeral, alar and spinal areas. Claws are curved on toe-tip. Their head were up briefly and they are seen to sleep all the time. Eyes are slightly open (Plate 1. D).

3 Days Old (9.6.08)

Feathers are longer. Their head up vertically well and Eyes are open. Nestlings have brightly orange coloured mouth (Plate 1. E). Their mouths open to accommodate food delivered by parent.

4 Days Old (10.6.08)

Head, wings feathers become denser. Upper side of body become black; under side reddish (Plate 1. F).

5-7 Days Old (11-13.6.08)

Developments increase rapidly within 3 days of post hatching period. Voice or food begging cries of young start. In response to their cries, the parents brought more food to the nest that was required for their nestlings. Parents bring food to the nest every 15 minutes to nourish their youngs from hatching to fledging. Nestlings receive food by direct insertion (Plate 1.H).

8-11 Days Old (14-17.6.08)

Hatchlings transform into a feathered juvenile (Plate 1. I). They can stand up in nest. As the day temperature rises, the mother protected the young from the heat of the sun by sitting over them and giving shade by her body (Plate 1.J). *T. gularis* apparently exhibit parental care (Plate 1, K,L). Nestlings stay in nest till eleven days old (Plate 1. M).

17 Days Old (18.6.08) or Fledging

When they are 17 days old, they leave their nest, fledging stage (Plate 1. N). *T. gularis* showed co-opperative behaviour.

Hatching, Fledging and Reproductive Success

Hatching success was 85.48 %, fledging success is 96.22 % and breeding success is 88.88 % (Table 2).

Mortality Rate

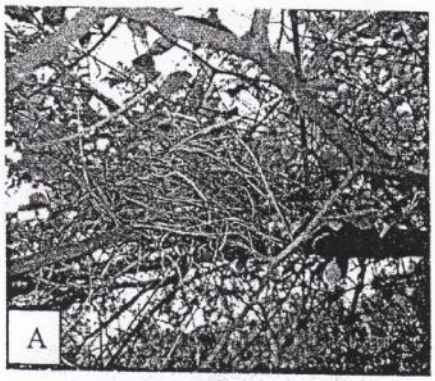
In 18 nests, average mortality rate was 17.74 % (Table 2).

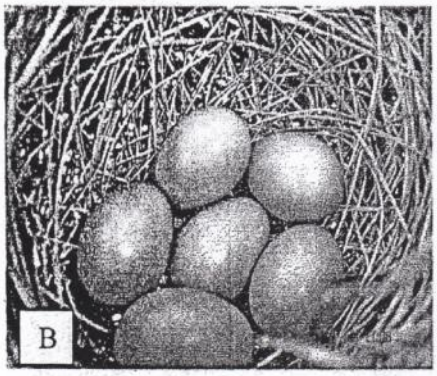
Table 1. List of clutch size in *Turdoides gularis* (March 2008 to July 2008)

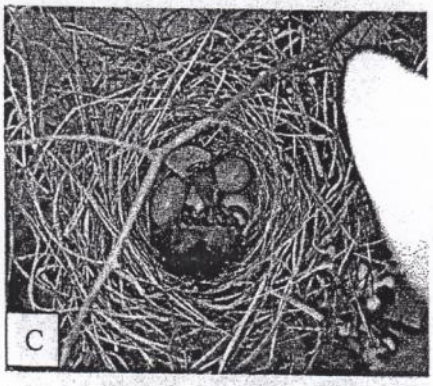
Sr. No.	Clutch size	Number of eggs				Lost		
		Nest observed	Eggs laid	Eggs hatched	Eggs unhatched	Eggs	Youngs	Successful fledglings
1	2	5	10	8	_	2	_	8
2	3	4	12	9	_	3	_	9
3	4	6	24	24	_	_	_	24
4	5	2	10	10	_	_	2	8
5	6	1	6	2	2	2	_	2

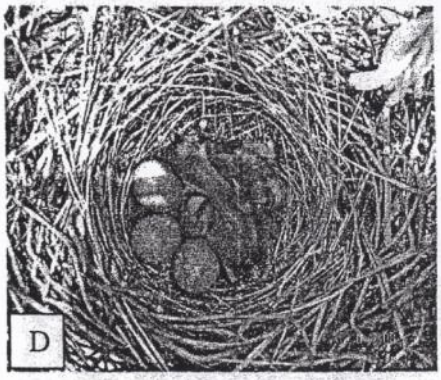
Table 2. Breeding success and Mortality rate in *Turdoides gularis*

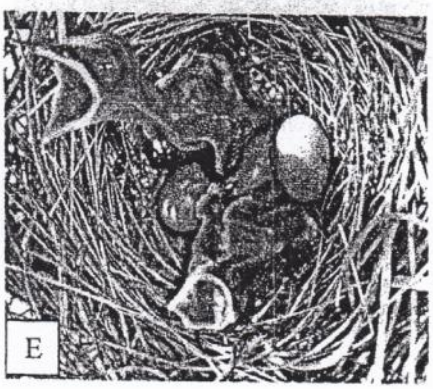
Sr. No.	Category	Percentage
1.	Hatching success	85.48 %
2.	Fledging success	96.22 %
3.	Reproductive success	88.88 %
4.	Mortality rate	17.74 %

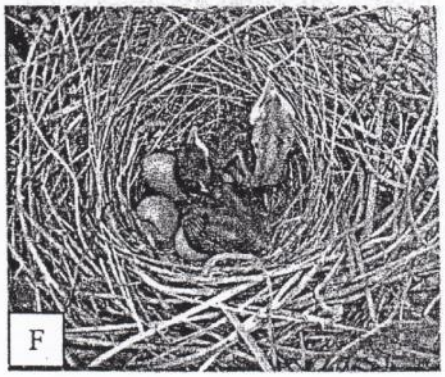


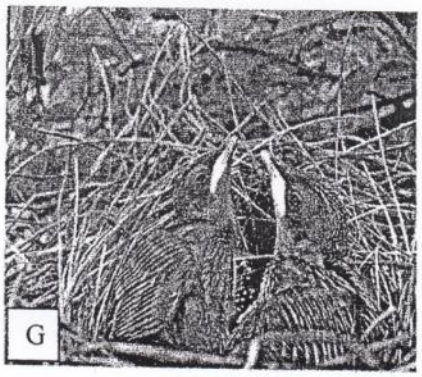








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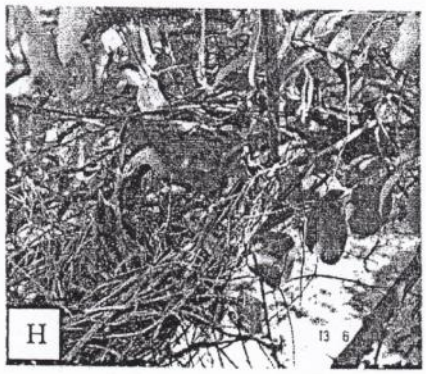
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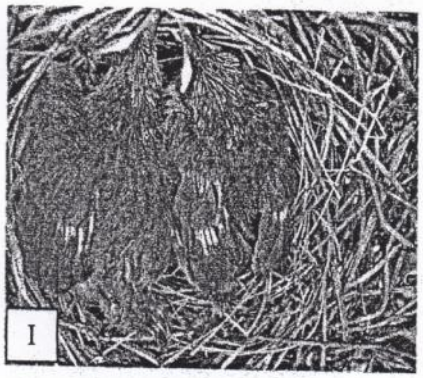
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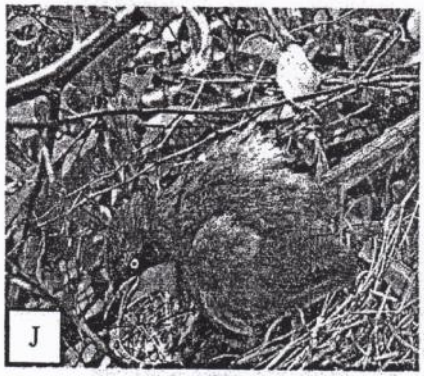
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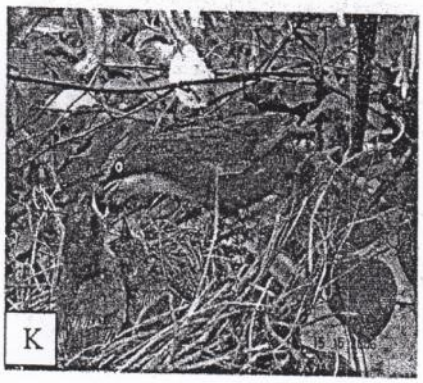
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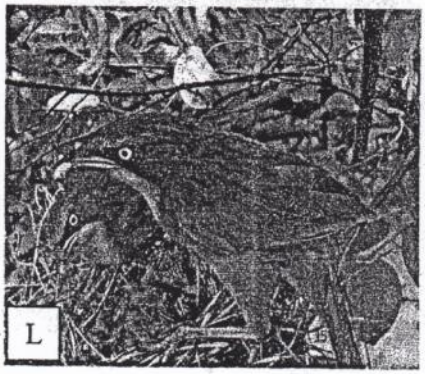
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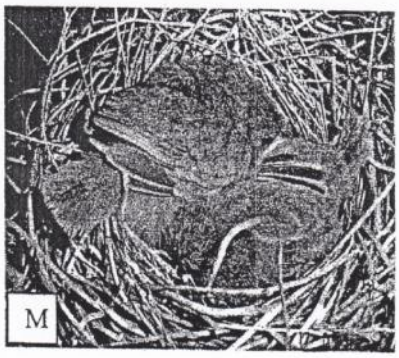

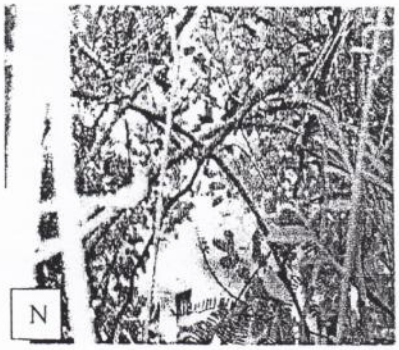

Plate 1. A. Nest on *Ziziphus mauritiana* (Zi)
B. Nest of 6 clutch size on *Ziziphus mauritiana* (Zi)
C. 1 day old *Turdoides gularis*
D. 2 days old *T. gularis*
E. 3 days old *T. gularis*
F. 4 days old *T. gularis*
G. 5 days old *T. gularis*
H. Feeding by parent
I. Feathered juvenile
J. Parent sitting on nest
K. Freeding by parent
L. Freeding by parents
M. Sleeping juveniles at night
N. Successful fledging to juvenile

Discussion

Birds, like most other wild vertebrates, show a distinct time pattern in their reproductive activity, and the evolution of periodic rather than continuous breeding is an adaptation that ensures that the young are produced when factors favouring survival tend to be optimal. In this context, food for the young and for the breeding adults appears to be the main determinant (Bligh, 1976, cited by Pohll, 2000).

The breeding season of white-throated babbler, *Turdoides gularis* Blyth (1855, is from early April to mid-June. The eggs, 3 or 4 in number are a bright deep blue. It makes a larger and more untidy nest of grass and reed blades (Smythies, 2001).

The breeding season of southern Pied- babbler *T. bicolor* extends from late September to early April, although this varies between years and is strongly rain-dependent. Clutch size varies between 2 and 5, with a modal clutch size of three. Average incubation time is 14 days, and average time between hatching and fledging is 16 days. (Wikipedia. org/ wiki/ southern pied- babbler, 2008).

Jungle babbler *T. striatus* feed spiders, cockroaches and other insects and larvae, wild figs, berries, grain and nectar of flowers. They built a nest a loosely built cup of twigs, rootlets and grass in the fork of a leafy branch 2-3m up. Eggs 3-4,

turquoise blue. Parental duties shared up both sexes and more or less communally. (IUCN, 2007).

Arabian babblers *T. squamiceps* are territorial, cooperative breeding passerines. Nestlings are altricial and fledge at about 12 to 14 days. Egg lying takes place usually between February and August. Breeding females lay between 3 and 5 eggs during each clutch (Zahavi, 1989, 1990). Their eyes opened between four and six days, during which time feather emerged. As fledglings, aged 12 to 14 days, their bodies were covered with plumage, but development of wings and tail were not complete and as a result, they were unable to fly (Avner *et al.*, 2001).

T. gularis has been worked by Khin Sann Ye (2007), who studied reproductive ecology. This agrees with Khin Sann Ye (2007) who founded the period of breeding season.

In this research work, during March to June 2008, 18 nests were found in various heights on thorn scrubs, *Citrus acida,* (Shauk), *Acacia chundra,* (Sha) and *Ziziphus mauritiana* (Zi). Site preference was showed to be 22.22 % of *C. acida,* 33.33 % of *Z. mauritiana* and 44.44 % of *A. chundra.* Nest site selection is importance because nest fate is not predictable.

A total of 62 eggs were recorded from 18 nests, 53 eggs hatched and 2 unhatched. Mean clutch size is 3.4. Unhatched eggs were either being infertile or containing defective embryos.

During study most nest and eggs were found in April and May 2008, sixth nest and 20 eggs. Least number of two nest and six eggs were found in June. No relationship between egg size and clutch size could be made. Late-nesting females produce fewer eggs and hence the offsprings. It may be due to seasonally declining nutrient availability or many reflect an attempt to reduce current reproductive investment in an effort to enhance future breeding potential.

After hatching, nestlings were at risk, since begging calls attract predators to the nest area (Haskell 1994, cited by Raihani and Ridley, 2007).

The length of time that the altricial young stay in the nest is correlated not only with the length of the incubation period (long incubation, long nesting period) but also with the size of the species, larger species having longer nestling periods (Welty and Baptista, 1990).

The breeding season of *Turdoides gularis* is early April to end of May. They make an untidy nest with grass, reed, and grass (Kaing). Eggs are 3 to 4 in a clutch, sapphire in colour. Average length of an egg is 2.26 cm and average width 1.85 cm (Hgnet-tha-bin Burma Translation Society, 1951). In this research work, average length of an egg is 2.2 cm and average width is 1.85 cm. Eggs are plain turquoise greenish blue in colour.

T. gularis is omnivorous, feeding on invertebrates and fruits. Their breeding success in this work is 88.88 % and they are co-operative breeder and exhibit parental care. This adaptable behaviour is in a way ensuring their sustainability.

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