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## On the fundamentals of breeding biology and present threats to red wattled lapwing (*Vanellus indicus*) in agricultural landscape of Punjab

**Kaur M and Dr. Khera KS**

**Abstract**

In this paper data is presented on the various aspects of the breeding biology of Red Wattled Lapwing. The present study was conducted for two consecutive years, from April 2012 to June 2013 in fields of Punjab Agricultural University (PAU), Ludhiana, Punjab, India. Red Wattled Lapwing is a seasonal breeder, with the peak of egg laying occurring in end of April to end of May. Total 37 nests were observed in two breeding seasons. Maximum nesting was observed in harvested wheat fields. Clutch size of 4 eggs was found to be more frequent. The incubation period was between 25 to 32 days. Average hatching success of 59% and 46.77 % was recorded during the 2012 and 2013 breeding seasons, respectively. Predation, nest damage and hatching failure, were possible reasons for low hatching success of Red Wattled Lapwing. Roles and behaviour of the parents were observed from egg laying to hatching.

**Keywords:** camouflage, courtship, hatching, incubation and red wattled lapwing

**1. Introduction**

Red Wattled Lapwing (*Vanellus indicus*) is an important ground bird of the agricultural ecosystem. It belongs to family Charadriidae of the avian order Charadriiformes<sup>[10]</sup>. It prefers open areas of villages and towns, found in pairs or in groups of 10 to 15 birds<sup>[19]</sup>. It is characterized by its slim, sleek body, deep black colour in neck and head, long yellow legs, prominent rough red wattle which extends from eyes to beak and can be seen on both sides of the face and brownish grey wings<sup>[8]</sup>. They are best known for their loud annoying alarm calls did he do it or pity to do it, that is why it is called 'The did-he-do-it bird'<sup>[10]</sup>.

Red Wattled Lapwing is a carnivorous bird as it sustains on a range of insects, snails and other invertebrates, mostly picked from agricultural fields. Therefore, Red Wattled Lapwing acts as natural biocontrol agent in controlling insect pests<sup>[2]</sup>. Recent studies had shown decrease in population of insectivorous birds which has caused a marked increase in insect and rodent pest problems<sup>[15, 17]</sup>. Gupta and Kaushik<sup>[8]</sup> also reported the drastic decline of the population of this species in Kurukshetra, Haryana. In view of this, the present study was planned to study the fundamentals of breeding biology and the threats to *Vanellus indicus* presently confronting in agricultural fields of PAU, Ludhiana, Punjab.

**2. Materials and Methods**

The present study was conducted for 15 months during the period of April 2012 to June 2013. In the given period of time, two breeding seasons had been observed. Observations were made using Nikon 10×50 binocular and digital camera in open agricultural fields of Punjab Agricultural University, Ludhiana, Punjab, India. Study was undertaken in different sites of the University, each site had a distinct diversity of cropland, food availability and water availability. All accessible nests were located by finding incubating birds and marked to relocate nests easily and quickly. Nests were searched thoroughly and systematically during the two breeding seasons. Mostly observations were taken during mid-day hours because nests were never left unattended during these hours due to high temperature.

Nests were observed every 2–5 days before clutch completion; however, frequent visits were made near hatching dates. When a nest was found empty, the contents were carefully scrutinized and recorded. Nests were considered as successful when eggshell fragments were present in the nest; or at least one chick was alive; or by observing behavior of the parents as

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they became aggressive if brood is present. A nest was assumed to have failed if it was found to be empty before the expected hatch date, or if there was evidence of predation (i.e. large egg fragments, dead chicks) <sup>[7]</sup>. Hatching success was calculated with the traditional method (% of eggs that hatched successfully out of total eggs laid).

The clutch size and incubation values were expressed as mean  $\pm$  standard error.

### 3. Results and Discussion

Breeding season of Red Wattled Lapwing was from April to June. Both sexes were similar in size and colour, thus difficult to differentiate. Pair formation usually started early in the month of April, in both 2012 and 2013 breeding seasons. At this time, they were seen flying together, feeding together in pairs in their nesting sites. According to Vyas and Rakesh <sup>[19]</sup> the breeding season of Red Wattled Lapwing was mainly from March to August. However, Lok and Subaraj <sup>[13]</sup> reported Red Wattled Lapwing nesting from February through to August. Breeding season observed in present study was similar to Steven and Geert <sup>[18]</sup> i.e. April to May. Courtship was seen in early April. One member of the pair produced characteristics slow tit-tit sound with puffed up feathers and pointed its beak upwards when he approached the female, followed by a rapid tit-tit when he mounted her. This phenomenon was frequently observed in pre-laying period when nest site selection was well underway. They mated several times during the day, mainly in early morning. This courtship behaviour and mating continued until the day before the last egg was laid.

Red Wattled Lapwing has been observed constructing its nest on the ground where it scratched a small depression on the ground surface. They used to build their nests near water sources so that they could keep their eggs cool by soaking their belly feathers in water and then sprinkle water on eggs. Nesting materials were found to consist of materials accumulated from nearby sites, (see Fig. 1 and Table 1). Gupta and Kaushik <sup>[8]</sup> observed that the nests of lapwing were stuffed by earth pebbles, straws and sometimes small stones. Lapwings frequently nest in arable land, where spring-sown fields offer suitable breeding conditions for a short period. Crop height should be below 8 cm in dense stands and 15 cm in more open crops, although heights up to 30 cm may be tolerated in cereals <sup>[12]</sup>, particularly where the plants are unusually well-spaced.

Females were seen occupying nests 3-4 days prior to egg laying. In total, 37 nests were recorded during 2 breeding seasons (April 2012- June 2013), out of which 20 nests were recorded in the 2012 breeding season, while 17 were recorded in 2013 breeding season. Harvested wheat fields were found to be most preferred for nesting in both breeding seasons as 15 nests were located on harvested wheat fields out of total 37 nests followed by empty fields without grass (6 nests) and empty fields slightly covered by grass (6 nests) (see Table 1). It was also observed that Red Wattled Lapwing preferred the seven same nesting sites during 2013 breeding seasons from 2012 breeding season, which might be of the same breeding pair.

The egg laying activity peaked around end of April to end of May. It was noted that eggs were laid generally at an interval of 24 hours, except for 2 nests. The clutch size of Red Wattled Lapwing, ranged from 2-4 eggs, but clutch size of 4 eggs was more frequent. Eggs were found to be elliptical with narrow end towards the centre of the nest which helps them from rolling away. They are greenish grey in colour with black

spots which covers their surfaces. Therefore, they are well camouflaged with the surrounding. Incubation period was calculated as the time taken between the laying of the last egg and hatching of the last chick. In Red Wattled Lapwing incubation period was observed to be ranged between 28- 38 days. The average time of incubation in the 2012 breeding season was 30 days while in 2013 breeding season was approximately 29.5 days (see Table 2).

Hatching pattern was studied in 37 clutches of 2 breeding seasons and it was found asynchronous. For 3-4 egg clutches, hatching continued for 2-3 days. Out of 4 clutches of 2 eggs, only 1 was hatched and it took only 1 day. Hatching success was recorded in 37 nests in all. The total number of eggs laid was 71 in 2012 breeding season, out of these 42 young ones recorded. While in 2013 breeding season, 29 young ones recorded out of 62 eggs laid. Therefore, average hatching success was 59% in 2012 and 46.77% in 2013 (see Table 2). According to Gupta and Kaushik <sup>[8]</sup> hatching success in Red Wattled Lapwing was found to be about 60.92% in Kurukshetra, Haryana state, India, while Muralidhar and Barve <sup>[14]</sup> reported 75% hatching success in Mumbai, Maharashtra. Compared to these studies, the hatching success in the present study was lower i.e. 59% and 46.77% in 2012 and 2013 respectively. It is important to mention that these eggs or nests were damaged due to anthropogenic activities like ploughing of fields by farmers or these were damaged by predators like House Crow, Kite and Dogs. The possible justification for this is the coincidence of breeding period of lapwings with numerous sowing and weeding activities, the hatching success of their brood may be severely affected by these activities. With such activities more frequent and varied impact on reproductive performance is also likely to be greater. As a result, overall nesting success might therefore be lower <sup>[18]</sup>. Although there have been several studies that provide strong evidence for the importance of avian predators, particularly Carrion Crows, as predators of lapwing clutches, there are no estimates of lapwing nest or chick predation by mammalian predators <sup>[1]</sup>. A nest was considered to be successful if egg laying, incubation and hatching were alive. In 2012 breeding season, out of 20 nests, most of the nests were unsuccessful as only 8 nests were successful; therefore nesting success recorded was 40%. In 2013 breeding season, 17 nests were recorded, out of which 7 nests were successful and 10 were unsuccessful, therefore nesting success recorded was 41.1% (as shown in Table 2). The actual hatching witnessed in one nest (as shown in Fig. 2), the chicks were seen on the same day of hatching in most cases.

Red Wattled Lapwing was found quite tolerant of human monitoring of their nests and allows touching their eggs and chicks. Parents used different types of calls, which were made to alert their young ones, regarding the presence of predator or visitor. It was also observed that lapwing chicks were precocial i.e. the young ones were relatively mature and mobile from the moment of birth and hatching and there was no fledging till 30-32 days. The grayish black down feathers of the young ones made them blended in with the surroundings (see Fig. 3). They actively responded to the alarming calls of the parents and used to crouch in the low grass immediately or they sat down motionless. Both the parents were seen defending the nest and the young one very aggressively against any intrusion by humans and other birds. Making frantic calls they dived at the invaders and tried to chase away them out of the territory. In fact, on the day of hatching the parents were seen closely monitoring each and every activity not only in the territory but even at the distant

edges of the territory. Parents took care of them until fledging. In early morning, these were seen foraging along with parents. The stages of development of Red Wattled Lapwing are shown in fig. 4. Survival rate of chicks in the first two weeks after hatching is low as reported by Desai and Malhotra [4], thereafter chances of survival increased.

Till date there has been no study on the range of threats being faced by the Lapwings in the state of Punjab. However, in the neighbouring state of Haryana agricultural intensification and urbanization has been considered to be a major cause responsible for decline of Yellow Wattled and Red Wattled Lapwings [8, 9]. It is well known that ground nesting birds are vulnerable to high rates of depredation of their eggs and young ones [16]. The present study area has a very high degree of human interference and potential predators especially, kites, crows and dogs. During the field visits Lapwings were seen aggressively chasing dogs, crows and stray dogs. The impact of House Crow, dogs and Kites as predators on the

nests of Lapwings is well documented [11]. Human threats to ground-nesting birds, are either direct i.e. damage to nest or young ones, or indirect i.e. habitat destruction and augmenting predator populations [6].

Recently Muralidhar and Barve [14], have reported unusual nesting of Red Wattled Lapwing on rooftops. Use of flat roofs for nesting has been suggested as an adaptive response of ground-nesting birds to the loss of habitats. Additionally, roofs have been suggested to be more protected from humans, most mammalian predators and grazing animals when compared to open ground [5]. It is important to note that these factors could be the main reasons for the bird to shift nest.

In conclusion, we do not control predation by predators but we do increase awareness among farmers as harvested wheat fields being the preferred nesting habitat of the Red Wattled Lapwing to increase the breeding success of this bird species in agricultural areas of Punjab.

**Table 1:** Number of nests and nesting material used in different fields in two breeding seasons of Red Wattled Lapwing.

S. No	Crop Fields	Number of nests in two breeding seasons	Nesting material used
1.	Empty field, without grass	6	Dry stems of trees, dung planks and dry grass
2.	Empty field, slightly covered by grass	6	Dry grass, dry stems of trees, wild plants and dry fruits of sheesham
3.	Empty field, densely covered by grass	3	Nests covered with wild plants
4.	Harvested mustard field	4	Dry mustard leaves and stems
5.	Harvested wheat field	15	Dung planks, wild plants, dry stems of wheat, dry grass, dry mustard leaves and dry stems of trees
6.	Grass field	3	Dry grass
	Total		37

**Table 2:** Breeding activities observed during the 2012 and 2013 breeding season of Red Wattled Lapwing.

S.NO.	Breeding activities	2012 breeding season	2013 breeding season
1.	Number of nests observed	20	17
2.	Number of eggs Laid	71	62
3.	Average clutch size (Mean±S.E.)	3.55±0.14	3.64±0.16
4.	Average incubation period in days (Mean±S.E.)	30±0.00	29.5±0.58
5.	Hatching Success (%)	59.15	46.77
6.	Nesting Success (%)	40	41.17
7.	Number of eggs predated/destroyed	29	33



A



B



C



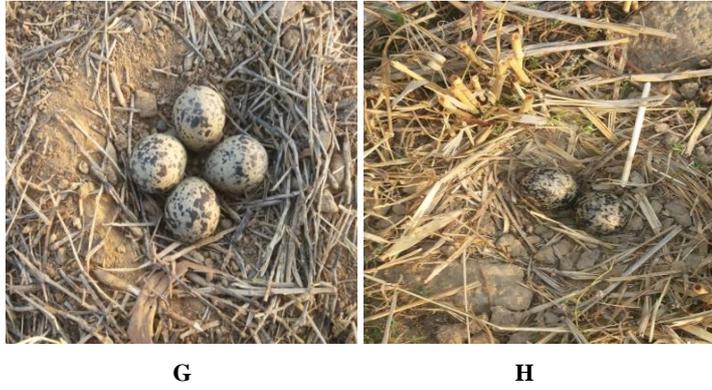
D



E

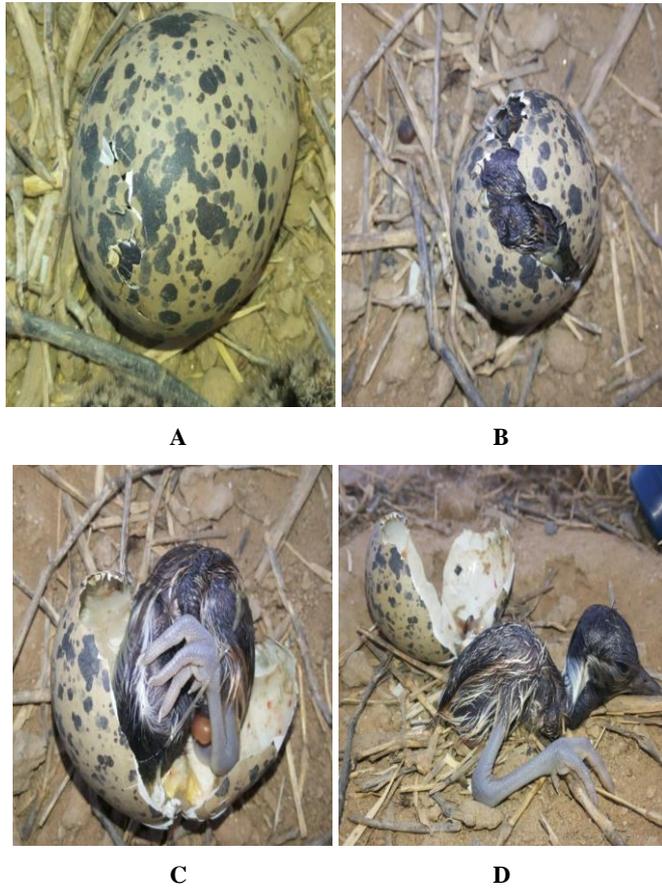


F

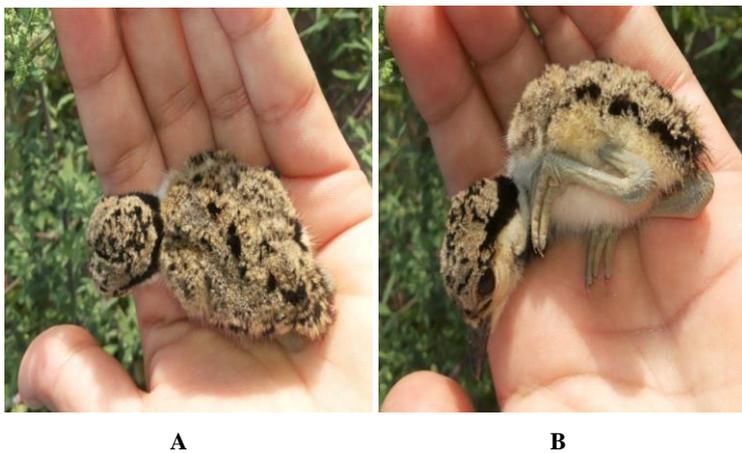


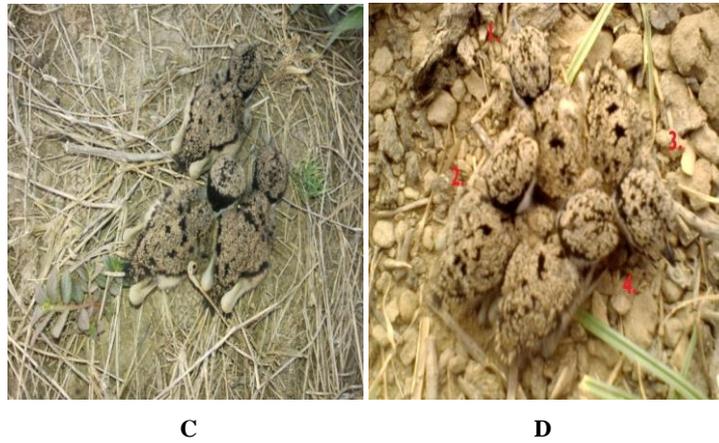
**Fig 1:** Different types of nesting material used by lapwing

- A-** Nest covered by dung planks
- B-** Nest covered by dry mustard stems and leaves
- C-** Nest on dry soil
- D-** Nest covered with dry fruit covers of sheesham
- F-** Nest covered by green grass
- G-** Nest covered by dry grass
- H-** Nest covered by dry wheat stems

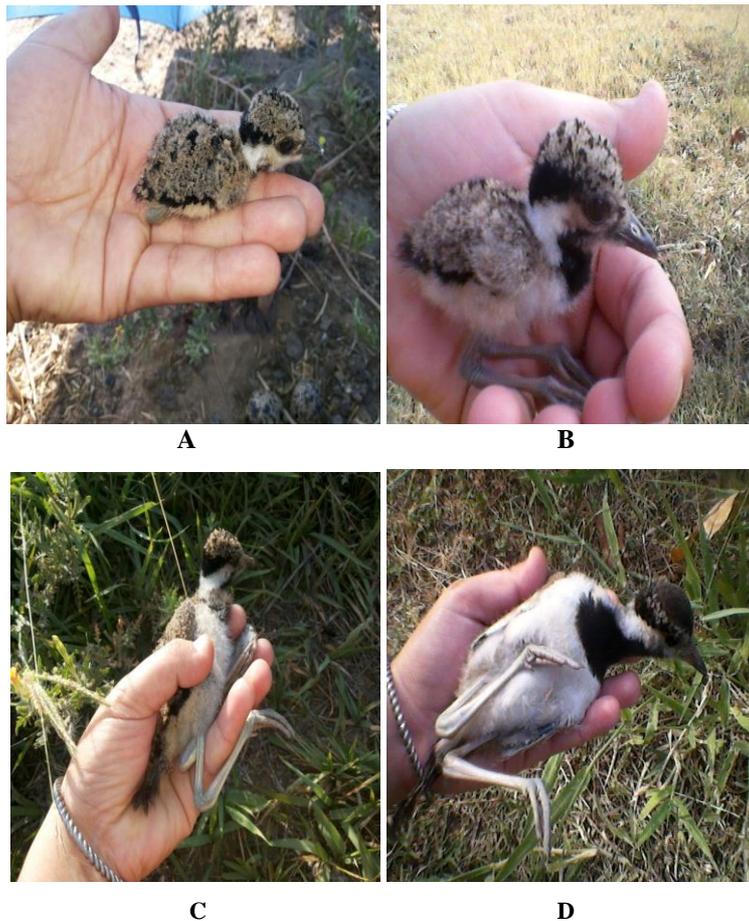


**Fig 2:** A-D: Different stages of hatching of Red Wattlebird egg





**Fig 3: A-B: Young ones**  
**C-D: Young ones well Camouflage with the background**



**Fig 4: Juveniles of Red Wattle Lapwing at different stages of growth**

**A-** 1 Day Old      **B-** 3-4 Days Old  
**C-** 20 Days Old    **D-** 30-32 Days Old

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