

Evaluation of Reproductive Success in Red Wattled Lapwing (*Vanellus indicus*) in two Diverse Habitats of Jammu (J&K)

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The present study is an attempt to analyse the reproductive success in Red Wattled Lapwing (*Vanellus indicus*) belonging to Order Charadriiformes, by comparing two nesting sites in Jammu. The nesting sites taken under consideration were open agricultural fields and the top of flat roofed buildings. The breeding season ranged from March to August with average clutch size of 3.53 ± 0.56 eggs ($n=30$) and an incubation period of 28-30 days. The most preferred site for nesting was found to be agricultural fields near some water source because of availability of food. In agricultural fields due to drying up of water source during peak summer, the scarcity in food resources for the young ones was noted thereby leading to the mortality of young ones of Red Wattled Lapwing, whereas it was also observed that on roof tops, eggs or hatchlings were easily predated by predators like monitor and the young ones were not able to land safely on the ground from such a height which caused their death.

Key words: Mortality, agricultural fields, roof tops, anthropogenic pressure, predation.

The Red - Wattled Lapwing is normally found in lowlands, but can be found as high up as 1800m, Piersma & Wiersma¹ (1996). They frequent open areas near fresh or brackish water such as rivers, mud banks, marshy grasslands, open forest with sporadic clearings, grassy fields, wasteland and dry gravelly ground with grass patches, Wells² (1999). For the survival and perpetuation of the race of any living being, reproduction is considered as one of the most important aspects of its life history. Reproductive success of lapwings depend on the breeding at the best time of the year relative to the food requirements of the laying female and the young, producing the optimal clutch size resulting in the greatest number of independent youngones during the parent's lifetime and adequately provisioning and protecting the young

during nestling and fledgling stages, Lack³ (1966); Perrins and Birkhead⁴ (1983). It is usually seen in pairs not far from water. Being insectivorous in diet, its breeding season commences from March to August, with four cryptically coloured eggs laid on bare ground or depression, sometimes fringed with pebbles. But the intense agriculture and regular change in agro-ecosystem has propelled lapwings to shift their nesting sites to the undisturbed flat roofed buildings.

MATERIAL AND METHODS

Study area

To evaluate the reproductive success trend in Red Wattled Lapwing (*Vanellus indicus*), the study area was broadly divided into two categories and further sub stations.

Open agricultural fields

St I

Gharana Wetland, R.S. Pura is situated between 32°36'51.52" N latitudes and 74°38'58.15"

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E longitudes. The main source of water at this station is Ranbir Canal. Most of the area is surrounded by lush green fields of Wheat and Rice. Dominant vegetation included trees like *Eucalyptus*, *Melia*, *Acacia*, *Eugenia jambolana* (Jamun). The area was observed to be least disturbed by transportation, thus providing a good habitat for birds. The soil was discerned to be rich in humus which supports the insect population, thereby making good feeding grounds for lapwing.

St II

Gho Manhasan is positioned at a latitude of 32°43'27.79"N and a longitude of 74°44'21.12" E with an elevation of 265 meters from mean sea level. It falls in Jammu tehsil and is about 12km from Jammu city. At this station, the main source of water is Gho Manhasa Stream.

Roofed buildings

St III

The campus of Jammu University was surveyed for the purpose. It lies at 32°67' N latitude and 76°50' E longitude and possessed trees like *Melia*, *Acacia*, Ashoka. It comprises of many departments having untrodden roof tops as a suitable habitat for lapwings.

St IV

This station lies between the latitude of 32°41'27.25" N and the longitude of 74°51'30.88" E with an altitude of 297 meters from the mean sea level. It is at a distance of upto 3 km from Jammu city.

Methodology

The study area was surveyed from March to September 2011. The nests were located by observing the incubating female with the help of binoculars (Bushnell 7x50 U.S.A. made). Regular visits were made with an interval of 24 hours, till the hatching of the young ones was completed. Analysis of the various disturbance progeniting factors for the incubating parents was done by having an appropriate distance from the nests. Besides, photography was also done by making use of Canon EOS camera with 300mm zoom lens and digital camera (DSC H-55).

RESULTS AND DISCUSSION

During the entire study period, data regarding the reproductive success, hatchling

survival and mortality losses were obtained by scrutinising the content of all nests. A total of 30 nests were surveyed in which mean hatching success (%) and breeding success (%) were noticed to be 36.67 ± 38.94 and 23.61 ± 33.82 respectively (Table 1). At all the stations, among various mortality factors analysed, predation was prevalent with a percentage mortality of 40% and unsafe landing was least responsible for the mortality of youngones of Red Wattled Lapwings (Table 2). The eggs were found to be prominently predated by *Herpestes edwardsi* (Common Mongoose), Varanus, Dog and *Corvus splendens* (House Crow). These predators were noted to take away the eggs before the hatching was completed. Nest predation was noticed to be the major cause of nest failure in Red Wattled lapwing which is a open nesting bird as reported by Ricklefs⁵ (1969) and Martin⁶ (1992).

Lapwings need a mosaic of habitats. They need different conditions for nesting and for chick rearing. Soon after hatching, the chicks follow their parents and move to suitable feeding areas, where the supply of surface invertebrates is good. But, at stations I & II due to the frequent use of pesticides, fertilizers and new agricultural practices their feeding grounds had dwindled drastically, which had caused the scarcity of food for young ones thereby, hampering their survival and resulting in starvation and ultimately to their death. Moreover, with change in cropping pattern, and frequent use of new agricultural tools, the owners of the field at stations I & II, inadvertently destroy the entire nest while ploughing or place the eggs on nearby bundh, leading to the destruction of nests and ultimately making the open agricultural fields unfit for breeding and forcing them to change their habitat to undisturbed flat roofed buildings like at stations III & IV. The most probable cause for this may be the availability of undisturbed area for the safe rearing of youngones and to enhance the breeding success. Besides, the pair is able to gauge the severity of the oncoming monsoons in advance and build on high ground to avoid their eggs and siblings from getting wet. Mundkur⁷ (1985) has put forth the same recording.

Notes about the Red wattled lapwing nesting on roof tops have accumulated over the years, Gole & Mundkur⁸ (1980), Tehsin & Lokhandwala⁹ (1982) and Patnaik¹⁰ (1980).

Apparently this roof nesting habit is not a new one. Baker¹¹ (1935) notes that even though the normal nesting place of this bird is the open ground, it also nests on flat roofed two storeyed houses and the roof of an indigo factory has also been used. Furthermore, with change in their breeding habitat from open agricultural fields to roofed buildings, their problems had increased more and more. Firstly, the roofed buildings reflect an obstructed habitat where the predators can easily conceal themselves in crevices or holes as compared to open agricultural fields, thereby resulting into an increment in predation. Secondly, due to the presence of cemented roof tops, the insects present are less in number, leading to

scarcity of food for young ones (if hatched) as well as for parents. Moreover, if 1-2 young ones (out of 4) survived for few days, it was observed that the young ones were not able to land safely on the ground from such a height resulting in their mortality.

Farmland birds are also exposed to agricultural practices, e.g. Ploughing and mowing, which have been showed to have negative effects on nests on fields e.g. 85% of total loss of lapwing nests in Central Sweden (Berg *et al.*¹² 1992a) and 16% of Curlew nests in Southern Finland (Valkama and Currie¹³ 1999) is due to agricultural activities (mowing, clearing, etc.) On comparing two diverse nesting habitats, it was observed that the nest loss

Table 1. Clutch characteristics of Red Wattled Lapwing studied at two habitats

S. No. of Nests	Clutch Size	Number of Hatchlings Produced	Number of Hatchlings Survived	Hatching Success (%)	Breeding Success / Chick Survival (%)
1.	3	3	0	100	0
2.	4	0	0	0	0
3.	4	2	2	50	50
4.	4	1	0	25	0
5.	4	0	0	0	0
6.	4	2	0	50	0
7.	4	0	0	0	0
8.	3	0	0	0	0
9.	4	0	0	0	0
10.	4	0	0	0	0
11.	2	0	0	0	0
12.	4	0	0	0	0
13.	3	2	0	66.66	0
14.	3	0	0	0	0
15.	4	0	0	0	0
16.	3	0	0	0	0
17.	4	2	2	50	50
18.	3	3	3	100	100
19.	3	3	1	100	33.33
20.	3	0	0	0	0
21.	4	1	1	25	25
22.	4	2	2	50	50
23.	3	2	2	66.66	66.66
24.	3	0	0	0	0
25.	4	3	3	75	75
26.	4	4	4	100	100
27.	3	3	3	100	100
28.	4	3	1	75	25
29.	4	0	0	0	0
30.	3	2	1	66.66	33.33
MEAN \pm SD	3.53 \pm 0.56	1.27 \pm 1.31	0.83 \pm 1.19	36.67 \pm 38.94	23.61 \pm 33.82

Table 2. Percentage nest loss of Red Wattled Lapwing in open agricultural fields (n=50) during the study period

Year	Number (and %) of nests lost to:				
	Total nests	Desertion	Depredation	Farm Work	Trampling
2010	40	07(17.5)	03(7.5)	09(22.5)	03(7.5)
2011	35	03(8.6)	02(5.7)	06(17.1)	04(11.4)

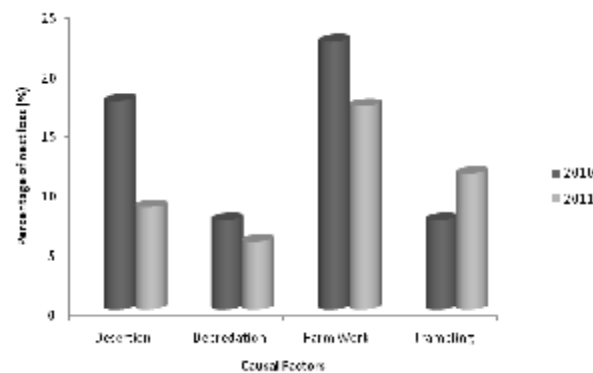
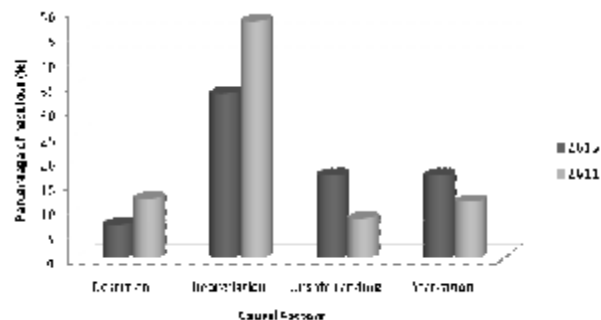
Table 3. Percentage nest loss of Red Wattled Lapwing in flat roofed buildings (n=50) during the study period

Year	Number (and %) of nests lost to:				
	Total nests	Desertion	Depredation	Unsafe Landing	Starvation
2010	30	02(6.7)	10(33.3)	05(16.7)	05(16.7)
2011	25	03(12)	12(48)	02(8)	03(12)

is more in case of flat roofed buildings (33.3% and 48% for 2010 and 2011 respectively) due to the depredation than open agricultural fields where it was observed to be 22.5% and 17.1% for 2010 and 2011 respectively (Tables 2&3).

Management and Recommendations

Strict conservative measures are mandatory for the efficient management of Red Wattled Lapwing (*Vanellus indicus*) which has depicted a diminution in the study area in the past few years due to low breeding success.

**Fig. 1.** Percentage nest loss of Red Wattled Lapwing in open agricultural fields (n=50) during the study period**Fig. 2.** Percentage nest loss of Red Wattled Lapwing in flat roofed buildings (n=50) during the study period

Following recommendations are put forth

- (a) Avoid grazing, trampling of cattle during the breeding period.
- (b) Ploughing of field should be done alternatively without destructing the nests.
- (c) Avoid planting new crops at the time of breeding.
- (d) Mass awareness among the people and the owners of the field should be generated.

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