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NESTING ECOLOGY OF RED-WATTLED LAPWING IN AGRICULTURAL LANDSCAPE

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ABSTRACT : The study was carried out on a small sample size of 4 km square area in summer season from March to June for two consecutive years 2007-08. From month wise calculations it was observed that in April nesting success rate was comparatively more than May and June because of low anthropological activities. No. of nests in grassland areas were found decreasing while in wetland areas increasing during April to June with maximum number of nests observed in May. Considerable diversity was observed in nesting sites of the lapwing. A trend to nest towards the centre of the water body was observed at rapidly shrinking water body during April to June.

Key words : *Nesting success, survival rate, agricultural practices, Red-wattled Lapwing, Vanellus indicus, water body, Osmanabad.*

INTRODUCTION

It is always a difficult task to find nests of ground nesting birds since the eggs are cryptically colored and usually matches the ground color. Red-wattled Lapwing usually nests on ground scrape or depression (Ali and Ripley,1980). Unusual nesting sites were also recorded in lapwings on roof-tops in residential areas, stones between railway tracks (Mundkur,1985; Tehsin & Lokhandwala, 1982; Reeves,1975, McCann,1941, Saxena,1973 and Patnaik,1980). Sometimes nest observed with pebbles, goat or hare droppings (Sharma,1992). It was also observed that nesting lapwings will attempt to dive bomb or distract potential predators (Rangaswami,1980; Bhatnagar,1978; Bhagwat,1991 and Kalsi & Khera,1987 and Naik *et al.*,1961). Incubation usually carried out both by the male and female and incubation period is normally 28 to 30 days. The chicks are nidifugous and precocial which means that they leaves the nest and follows the parents soon after hatching. Usually egg mortality is high due to predation by mongooses, crows and kites. Chicks have a lower mortality and their survival improved after the first week (Desai and Malhotra,1976). The chicks with perfect camouflage typically lie still when alarmed (Ali & Ripley,1980). Agriculture has been determined as one of the important factor in survival of ground nesting birds such as Red-wattled Lapwing. Some positive as well as negative effects agricultural activities on breeding success of lapwings were recorded. Despite high disturbance overall breeding success rate in Lapwing was found affected by various agricultural activities. It was observed that changing crop pattern and clilmatic factors such as rainfall affect the breeding success of Red-wattled Lapwing (Narwade & Fartade,2008 and Narwade *et al.*,2010). Through this paper an attempt has been made to focus on the nesting ecology of Red-wattled Lapwing *Vanellus indicus* in agricultural landscape.

MATERIAL AND METHODS

The study was concentrated in Masla village of Tuljapur taluka of Osmanabad district, Maharashtra. It lies between 21°47' N and 74°28' E at a sea level altitude of 540 m. The study area comes under Southern Tropical Thorn forest. The terrain is undulating with patches of open and dry grassland. We selected an area of 2 x 2 = 4 km square as our core study area around a small lake. Study was carried out in summer season from March to June in two consecutive years, 2007-08. The major cropping season here is monsoon from July onwards and harvesting is carried out in October-November. Farmers used to take Jowar *Sorghum vulgare* as a major Khariph crop after taking any one of three months crop like Urid and harvesting was carried out during January-February Most of the land, except under sugarcane cultivation and grape fields is fallow after harvesting was done in summer season. Thus major breeding activity of Red-wattled Lapwing was observed in summer until onset of monsoon.

Weekly observations of breeding pairs from the 4 sq km area were carried out from 1st March to 30th June for both the years 2007-08. Monitoring and counting of the nests was carried out twice a week. From each nest distance from water body, observations for date of nest preparation, egg laying, egg incubation and egg hatching were recorded. For calculation of survival probability following the number of days the nest was exposed to the predation, foul weather, etc. were counted as "exposure days" (Gardali,2006 and

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Mayfiled,1961,1975). The total number of days nest was observed active and hence susceptible to failure were counted. Only truly active nests *i.e.* nests having at least one egg were included.

RESULTS AND DISCUSSION

In total 27 nests were observed in year 2007, while data for 23 nests was collected in 2008. Study on effect of agricultural practices on breeding success of Red-wattled Lapwing *Vanellus indicus* was carried out (Narwade *et al.*,2010). Through this paper we focused only on nesting ecology.

After harvesting in summer season from March, males of Red-wattled Lapwing starts display to attract the partners. After successful selection, pair of birds starts scanning the area for suitable nesting sites (Fig.1). It was found that lapwings try many areas before finalization of the nesting site. For nesting, factors such as low disturbance, open area for vigilance and availability of water for belly soaking for lapwings were found very essential. Couple of nests was observed very close to passerby road *i.e.* only 10 feet away.

Table. 1 Month wise nesting.

	April	**May**	**June**	**Total**
Successful Nests	9	8	2	19
Unsuccessful Nests	5	21	5	31
No. of nests observed per month	14	29	7	50
% of successful nests	**64.28571429**	**27.58621**	**28.57143**	

Fig. 1 Lapwing checking the area for nesting.

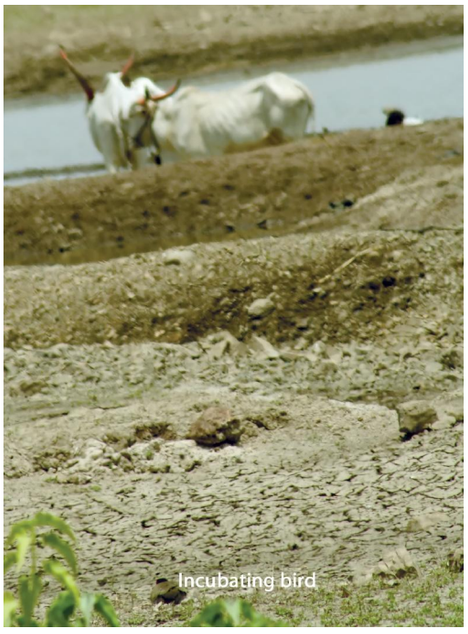

Fig. 2 Incubating Red-wattled Lapwing near waterbody.

Table. 2 Daily survival of Red-wattled Lapwing (simple Mayfield method).

Total no. of exposure days	389.05
Number of failed eggs	31
Daily survival probability = 1 - (total number of failed nests/total number of exposure days) = 1-31/389.05	0.92032
Daily survival probability raise to nesting period of 27 days = 0.92032^{27}	0.10625

Table.1 shows the month wise nesting success of Red-wattled Lapwing. In April nesting success rate is comparatively more than May and June, because of low anthropological activities. Possible reasons for nesting failures in May and June are may be effect of agricultural practices such as ploughing and presence of jackal (Narwade *et al.*,2010). To get more clear idea about nesting success, daily survival probability was calculated. Daily survival is a probability that the nest will survive from one day to the next. For total 50 nests, 31 were failed with 389.05 exposure days; the daily survival probability would be 0.92032. The total survival probability would be 0.10625 for the entire nesting period of 27 days. Nest survival is the probability that a nest fledges at least one young. There is 11% chances that in Red-wattled Lapwing, a nest will fledge at least one young (Table.2).

Table. 3 Habitat wise nest site selection.

	April	**May**	**June**	**Total**
Grassland	4	2	0	5
Wetland	9	14	3	26
farmland	1	13	4	18
Total	**14**	**29**	**7**	**50**

Table. 4 Index of diversity of nesting sites of Red-wattled Lapwing.

H’	50log50-(6log6+26log26+18log18)]/50	0.4182
Hmax	log3	0.477
J’	H’/Hmax	0.4182/0.477=0.8767

We divided the entire study area in to three types of habitats *viz.* grassland, farmland and wetland. Number of nests in grassland areas were found decreasing and in wetland areas increasing during April to June (Table.3&Fig.3). Maximum number of nests were observed in May. From the Shannon’s index (J’) (Zar,2007), it was observed that the nest sites were distributed quite evenly among grassland, wetland and farmland habitats with highest number in wetland area. In other words considerable diversity in selection of nesting sites of Lapwings was observed (Table.4).

Red-wattled Lapwing needs water to soak their belly feather to cool the eggs during hot weather (Sundararaman,1989). We measured the average distance between nearest water source and nesting site was found in between 50-350 feet. Fig.4 shows the decreasing distance between nesting site and the centre of water body from April to June (n=26, nests observed only in wetland area were considered for analysis). In other words we can say that in shrinking water body, the increasing trend to nest towards the water was observed in Lapwing (Fig.2).

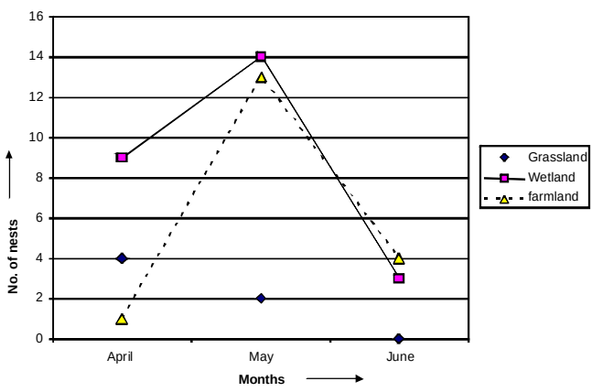

Fig. 3 Habitat and month wise nest site selection.

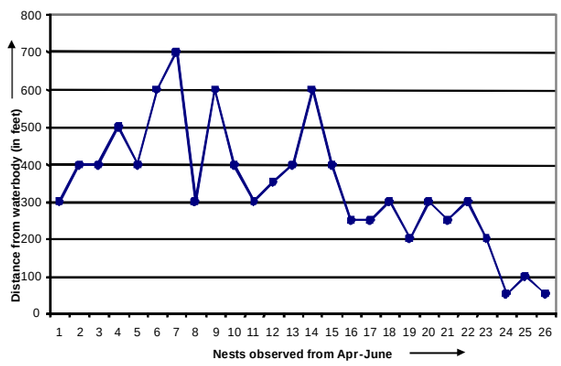

Fig. 4 Decreasing distance between nesting site and the centre of water body (n=26).

Association between birds and agriculture is a well known subject. Birds help in pollination and subsequently in to the crop yield. Agricultural activities determine fate of many birds providing feeding and breeding sources. In our study it was found that change in cropping pattern and land use has been responsible for survival of Red-wattled Lapwing. Other factors such as pesticide use, irrigation schemes and use of machineries for agricultural practices may be affecting the survival of Lapwing and ground nesting birds. It is important to carry out an extensive study in agricultural landscape for better conservation management, for all ground nesting birds.

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