J. Exp. Zool. India Vol. 13, No. 1, pp. 15-22, 2010 *ISSN 0972-0030*

BREEDING BEHAVIOUR OF PEAFOWL, *PAVO CRISTATUS* LINNAEUS, 1758 IN DISTRICT KURUKSHETRA, HARYANA (INDIA)

Girish Chopra and Tarsem Kumar

Department of Zoology, Kurukshetra University, Kurukshetra - 136119, India.
e mail : Tarsemkuk@gmail.com

(Accepted 22 November 2009)

ABSTRACT – Various aspects of breeding behaviour of peafowl, namely, periods of courtship, nest building and egg laying; sites for nesting, nest morphometry, clutch size, egg volume per clutch and period of hatching etc. were studied at Saraswati plantation wildlife sanctuary (SPWS), Bir sonti reserve forest (BSRF) and Jhrouli kalan village and its agricultural lands (JKAL) in district Kurukshetra (Haryana) from October, 2008 to September, 2009. Breeding activities of peafowl were found confined to the premonsoon and monsoon months. Male peafowls were found displaying between mid May to the end of June, 2009; the number of recorded male displays varied from 1 to 17 per visit in SPWS, 3 to 14 per visit in BSRF and 2 to 27 per visit in JKAL during periodic weekly visits in these months. Male-female pairing and subsequent nest building activity were witnessed between mid June to mid July, 2009. In all, 13 peafowl nests were located in the study areas. Of these, 10 nests were located beneath the thick *Capparis sepiaria* thorny bushes with *Cyprus rotundus* grass around; 2 nests were located in thick *Desmostachya bipinnata* grass and 1 nest was located in nearly fallow land. All the nests were built in small depressions on the ground using variety of materials in different proportions such as dry grass blades, dry *Delbergia* leaves, dry bamboo leaves, dry *Eucalyptus* leaves, detritus, petioles of leaves etc. Various nest morphometric parameters such as position, depth, diameter and circumference of each nest were also recorded. Egg laying was witnessed from late July to mid August, 2009 with clutch size varying from 2-6. Most of the times eggs were laid in the evening hours well before sunset. In each clutch, after the first laid egg, the respective females laid each subsequent egg after a gap of approximate 48 hours. The egg volume in different clutches varied in all the 13 viable studied nests. Incubation of eggs done by the females alone. The newly hatched chicks were observed in the mid September, 2009.

Key words : Breeding behavior, peafowl, monsoon, clutch size, chicks.

INTRODUCTION

Breeding behaviour in birds generally coincides with the availability of abundant food and congenial climatic conditions (Musavi, 2000) when birds display courtship, nest building, subsequent egg laying and incubation of eggs. No bird gives birth to live young. Instead, they built their nests to protect themselves, their eggs and their young from predators and from adverse weather (Collias *et al,* 1984). Nests are built in great variety of forms, utilizing greater variety of materials, and on a greater variety of sites. These may be casually constructed from ready-to-use pebbles, sticks or laboriously woven from natural fibers ranging in size from the few sticks assembled by some to the gargantuan aeries of eagle (Gill, 1994). Bird nests on the ground are more vulnerable to mammalian predators than nests on the trees or in bushes. The Galliformes birds are known to construct their nests on the ground generally in thick bushes to avoid predation from mammalian species (Andersson 1994; McGowan, 2002). Earlier, some workers have studied nesting and egg laying of peafowl in North India (Johansingh and Murali, 1978; Subramanian and John, 2000) as well as in South India (Yasmin, 1995). Nesting and egg laying of peafowl coincided with the onset of monsoon in these regions.

Over the years, fragmentation of natural habitats and increased urbanization has taken a heavy toll on the bird and mammalian biodiversity, particularly in developing nations including India. These factors have also affected the regional populations of *Pavo cristatus*, in particular, in many parts of our country. In Haryana, peafowl still persists in sufficient numbers in different districts, particularly in district Hisar, Kurukshetra, Mohindergarh, Narnoul, Panchkula and Yamunanagar (unpubl. obs.). Studies related to their ecology, breeding biology and conservation are lacking in this region. Therefore, present study was conducted on several aspects of breeding biology of common peafowl (*Pavo cristatus*) at three study sites, namely, Saraswati plantation wildlife sanctuary (SPWS), Bir Sonti Reserve Forest (BSRF), and Jhrouli Kalan village (JKAL) in district Kurukshetra, Haryana (India).

MATERIALS AND METHODS

Three study sites, namely, Saraswati plantation wildlife sanctuary (76°27' to 76°33' E and 29°56' to 30°01'N), Bir

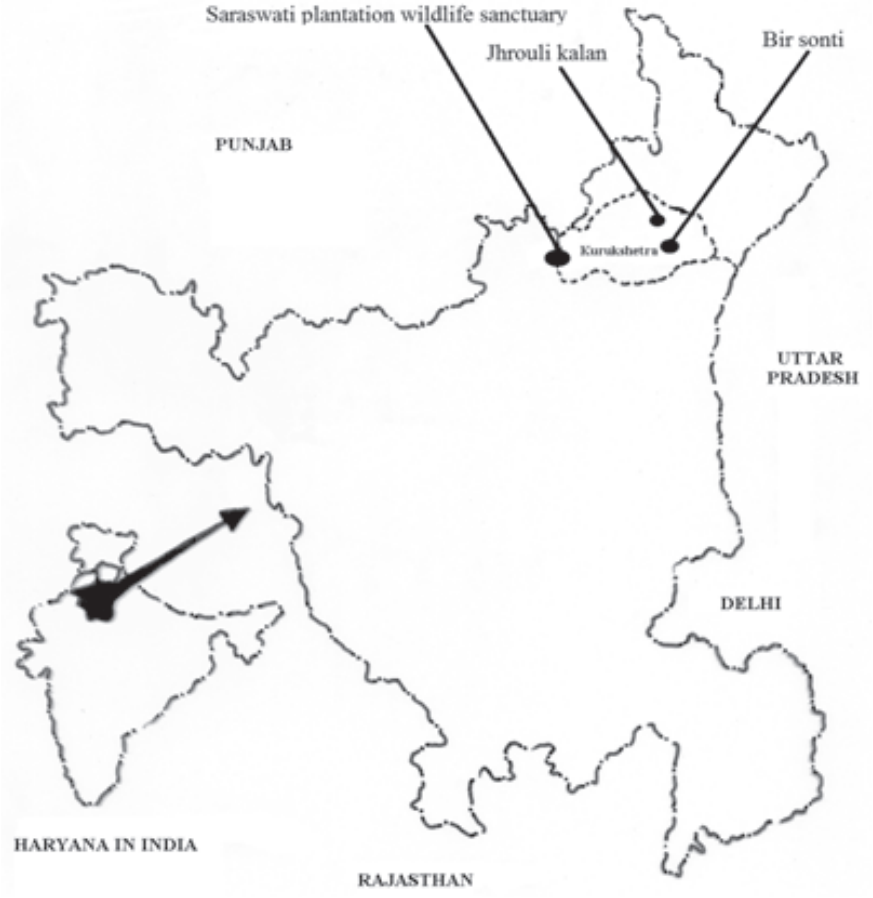

Fig 1 : Map showing position of study areas in district Kurukshetra, Haryana (INDIA)

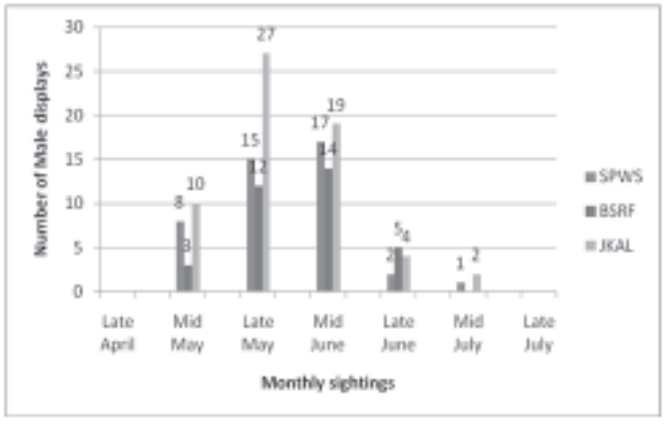

Fig 2 : Showing Number of Male displays during months of breeding season.

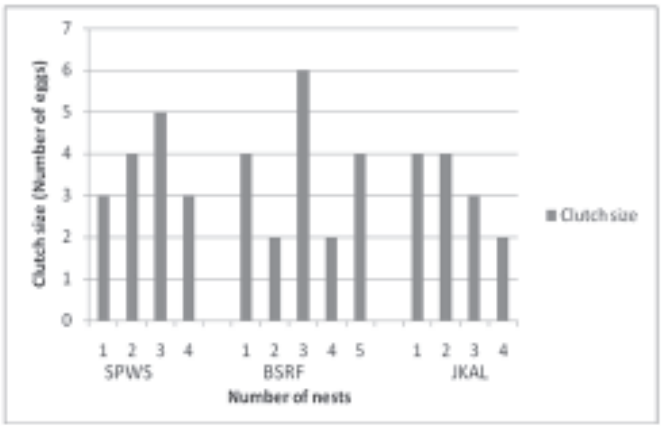

Fig 3 : Showing variation in clutch size (Number of eggs/ nest) in different nests

Sonti Reserve Forest (76°93' to 76°95' E and 29°63' to 29°65' N), and Jhrouli Kalan village (76°39' to 76°41'E and 30°18' to 30°19'N) were selected in district Kurukshetra (Fig. 1) for the present study. Saraswati plantation wildlife sanctuary is located in Kurukshetra and Kaithal districts of Haryana with an area of 11,003 acres (44.53 sq. km) in both districts (Dagar *et al*, 2001). Bir sonti reserve forest is located in Tehsil Ladwa of district Kurukshetra, on Kurukshetra-Yamunanagar link road with an area of 474.5 acres while the third study site, *i.e.,* Jhrouli kalan village is located on the Shahabad- Kalsana-Pehowa road covering an area of around 600 acres. Of these three study sites, Saraswati plantation wildlife sanctuary (SPWS) and Bir Sonti Reserve Forest (BSRF)

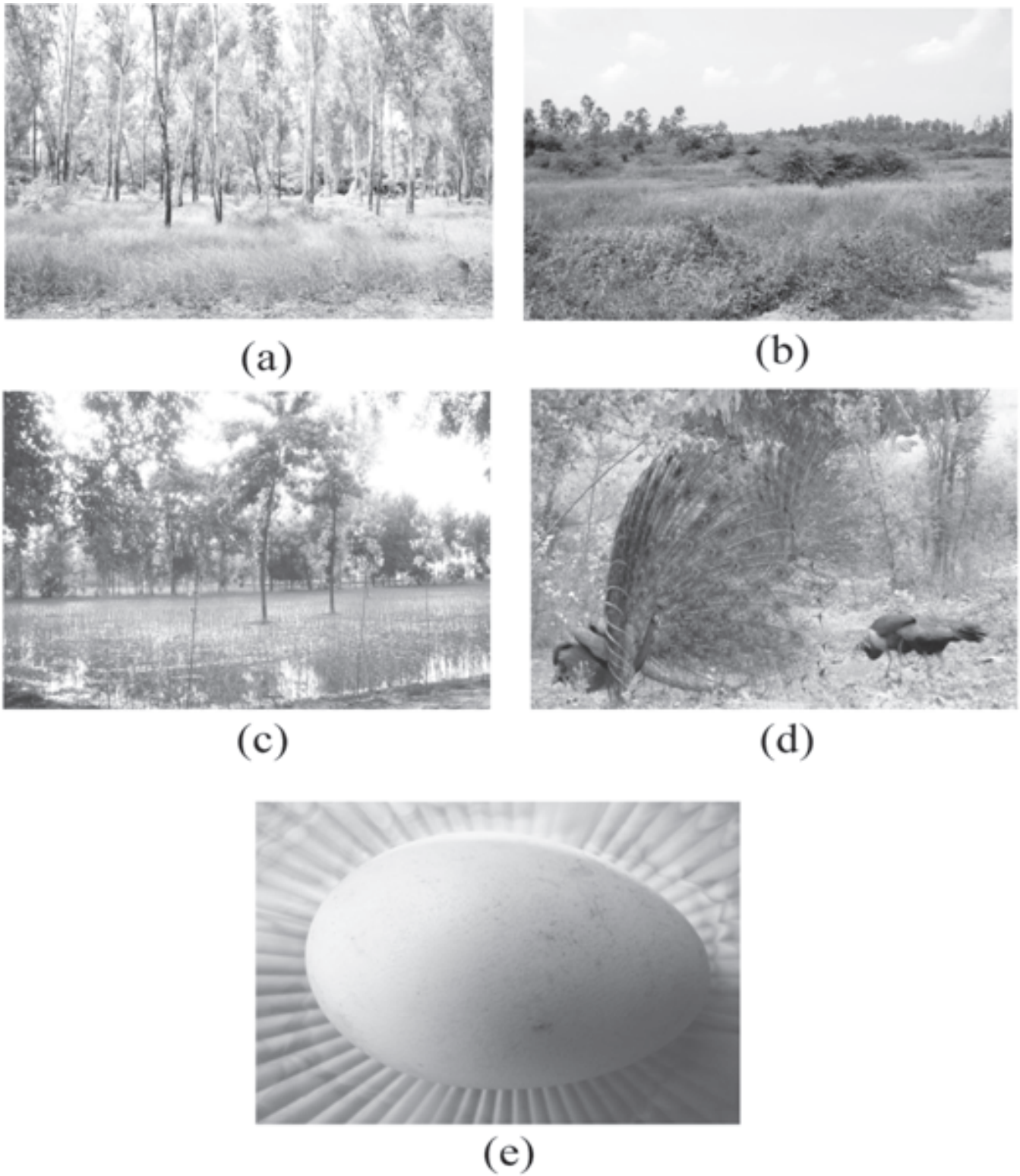

Plate 1 : Overview of (a) Saraswati plantation wildlife sanctuary (b) Bir sonti reserve forest and (c) Jhrouli Kalan and its agricultural fields; (d) Showing male peafowl display (e) close view of peafowl egg.

are preserved areas as declared by Government of Haryana harboring both natural and cultivated flora. On the other hand, Jhrouli kalan site (JKAL) has residential premises surrounded by agriculture fields and an orchard on one side of the village.

Breeding behaviour of peafowl was studied in these selected three study sites from October, 2008 to September, 2009. Period of courtship, nest building, egg laying and period of hatching were studied at these study

Table 1 : Showing percentage of materials used in construction of peafowl nests.

Nest Number	Bamboo leaves	Delbergia leave	Dry grass	Eucalyptus leaves	Detritus	Petioles
SPWS						
1.	-------	-------	100.00	-------	-------	-------
2.	-------	-------	-------	58.33	-------	41.66
3.	-------	-------	32.35	47.05	-------	20.59
4.	-------	-------	09.24	74.24	-------	16.52
BSRF						
5.	-------	-------	-------	69.56	-------	30.43
6.	-------	-------	44.44	55.55	-------	-------
7.	-------	-------	100.00	-------	-------	-------
8.	-------	-------	-------	-------	-------	-------
9.	69.64	-------	-------	-------	-------	30.36
JKAL						
10.	-------	-------	-------	-------	88.00	12.00
11.	-------	-------	-------	-------	-------	-------
12.	-------	94.52	-------	-------	-------	05.48
13.	-------	-------	-------	90.13	-------	09.87

Table 2 : Various morphometric parameters of peafowl nests.

Nest Number	Position	Depth (cm.)	Diameter (cm.)	Circumference (cm.)
SPWS				
1.	Thick grass	6.33	45	141.30
2.	Thick grass	7.30	34	106.76
3.	Bush	6.52	55	172.70
4.	Fallow land	4.70	28	87.92
	Mean±S.D.	6.20 ±1.08	40.50±11.95	127.17±37.54
BSRF				
1.	Bush	7	60	188.45
2.	Bush	3	21	65.94
3.	Bush	4	46	144.97
4.	Bush	3.50	38	119.32
5.	Bush	2.33	42	131.88
	Mean±S.D.	3.96±1.81	41.40±14.09	130.11±44.33
JKAL				
1.	Bush	4	24	150.72
2.	Bush	4	20.57	128.74
3	Bush	3	21.52	135.02
4.	Bush	2	30.51	191.50
	Mean±S.D.	3.25±0.95	24.12±4.49	151.49±28.22

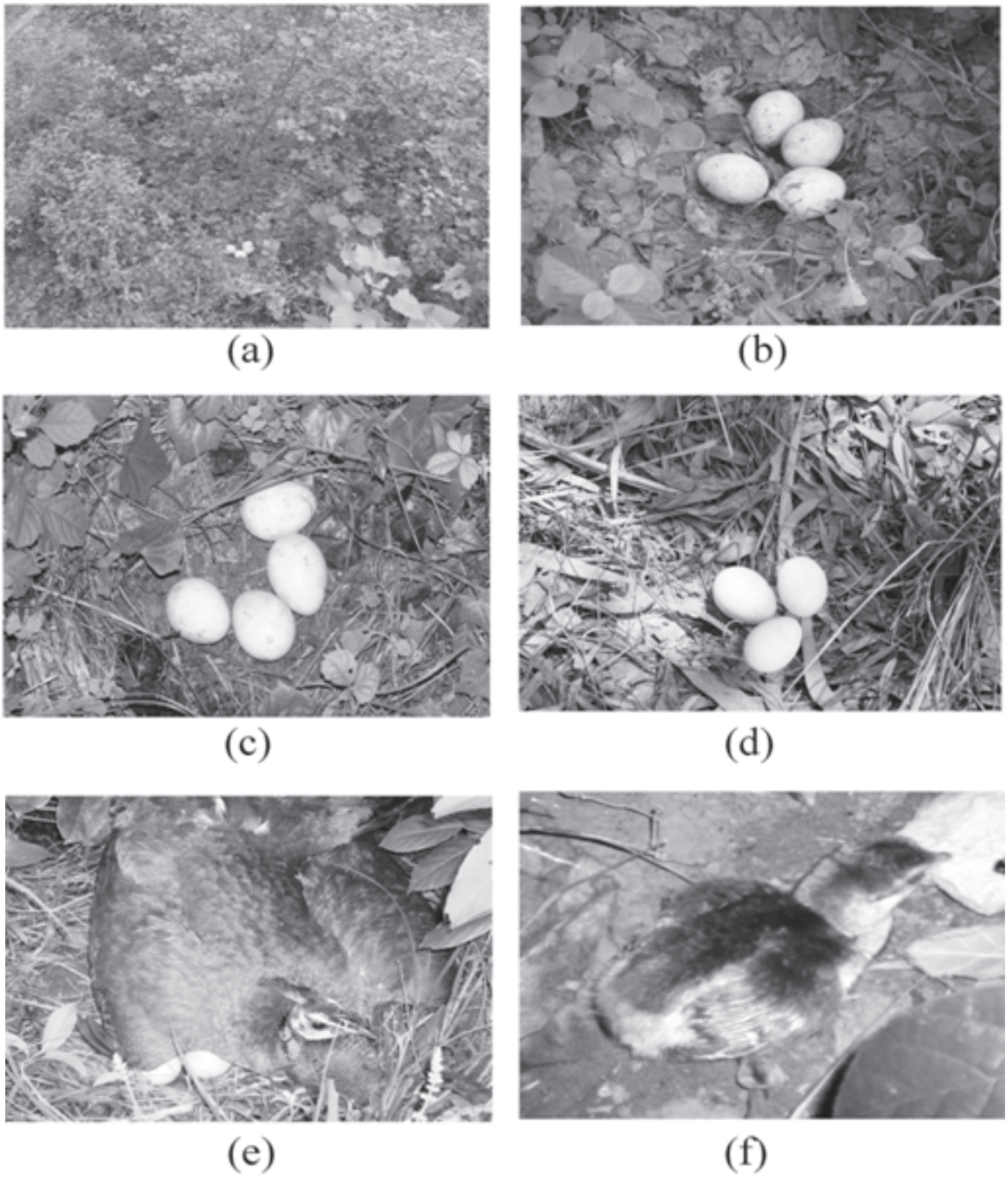

Plate 2 : Peafowl nests (a) in Thick bushes (b) Exposed nest made with dry leaves (c) Exposed nest made by using detritus (d) nest made of dry leaves found in nearly fallow land (e) Female peafowl incubating eggs (f) Newborn chick of peafowl.

sites. The study sites were thoroughly scanned to locate peafowl nests. Various parameters such as sites for nesting, periods of nesting, egg laying and hatching, materials used for nesting, nest morphometry (position, diameter, circumference, depth of nest), clutch size and egg volume per clutch were recorded at all the three study sites. Data obtained was later on statistically analysed.

Table 3 : Showing Mean egg volume of peafowl *P. cristatus*.

S. no	Mean Length of eggs (cm.)	Mean Width of eggs (cm.)	Mean Volume of eggs (cm^3)	Mean egg volume±S.D
1.	7.33	5.55	225.78	
2.	7.04	5.10	183.11	
3.	6.84	5.14	180.71	
4.	6.53	5.07	167.85	
5.	6.71	5.23	183.53	
6.	6.55	5.11	171.03	
7.	7.36	5.41	215.41	189.15 ± 19.93
8.	7.20	5.13	189.48	
9.	6.91	5.10	179.72	
10.	6.89	5.11	179.91	
11.	7.22	5.60	226.41	
12.	6.87	5.12	180.09	
13.	6.56	5.18	176.02	

RESULTS

Breeding behaviour of peafowl (*Pavo cristatus*) was found to coincide with premonsoon and monsoon period, *i.e.,* from May to September, 2009 in all the three study sites, namely, Saraswati plantation wildlife sanctuary, Bir Sonti Reserve Forest and Jhrouli kalan in district Kurukshetra. The courtship behaviour was noticed from mid May to end of June, 2009 when the male peafowls were observed displaying to attract the females (Plate 1.d). The number of recorded male displays varied from 1 to 17 per visit in SPWS, 3 to 14 per visit in BSRF and 2 to 27 per visit in JKAL (Fig. 2) during courtship period. Male-female pairing and subsequent nest building activities were witnessed between mid June to mid July, 2009. The frequency of displays by male peafowls gradually declined towards the end of courtship period.

In all, 13 nests (4 in SPWS, 5 in BSRF and 4 in JKAL) were located after thorough scanning of all the three study sites. Of these, 10 nests were found beneath the thick *Capparis sepiaria* thorny bushes with *Cyprus rotundus* grass around; 2 nests were located in thick *Desmostachya bipinnata* grass and 1 nest was located in nearly fallow land. All these nests were viable nests. These nests were built in small depression in the ground using variety of materials (Table 1).

Various morphometric parameters of peafowl nests (*i.e.,* position, depth, diameter and circumference) were recorded at all the three study sites in district Kurukshetra. Of the 13 nests studied, 10 nests were located beneath thick thorny bushes, 2 nests were located in thick grasses and 1 nest was found in nearly fallow land. Depth of the nests varied from 4.70-7.30 cm with a mean of 6.20±1.08 cm in SPWS; 2.33-7 cm with a mean of 3.96±1.81 cm in BSRF and 2.0-4.0 cm with a mean of 3.25±0.95 cm in JKAL study site respectively. Diameter of the nests also varied from a minimum of 20.50 cm to a maximum of 60 cm with a mean of 40.50±11.95 cm, 41.40±14.09 cm and 24.12±4.49 cm respectively in SPWS, BSRF and JKAL study sites. Circumference of nests too showed great variations; it varied from 87.92-172.70 cm (mean 127.17±37.54) in SPWS, 65.94-188.45 cm (mean 130.11±44.33 cm) in BSRF and 128.74-191.50 (mean 151.49±28.22 cm) in JKAL study site(Table 2).

Egg laying activity of peafowl was recorded from late July to mid August, 2009. In observed nests, white or buff coloured eggs were found in variable numbers; each egg having thick closely pitted shell (Plate 1.e). The clutch size varied from 3-5 in SPWS, 2-6 in BSRF and 2-4 in JKAL study site respectively. After the first egg laid in each of the 13 studied nests, each subsequent egg was laid after a gap of about approximate 48 hours by the respective females. The egg volume varied from a minimum of 167.85 to a maximum of 226.41 with a mean of 189.15±19.93 in different clutches in all the 13 observed nests (Table 3). Incubation of eggs done by the females alone (Plate 2.e). The newly hatched chicks (Plate 2.f) were observed in mid September, 2009 in all the three study sites.

DISCUSSION

In different parts of India, breeding season of peafowl usually coincides with the onset of rainy season (Thaker, 1963; Johansgard, 1986; Ali and Ripley, 1987; Subramanian and John, 2000).The arrival of monsoon decreases the atmospheric temperature and various atmospheric changes stimulate the male display to attract female peafowl for breeding activity (Petrie *et al*, 1991). In Tamilnadu (eastern coast of South India), breeding season of peafowl extended from November to March (Johansingh and Murali, 1978; Subramanian and John, 2000) and January to April (Johansgard, 1986). However, in north India, prebreeding season of peafowl starts from March to June followed by breeding season from July to September and non breeding season from November to February (Yasmin, 1995). In the present study too, breeding activities of peafowl were confined to the premonsoon and monsoon months, *i.e.,* from mid May to late September, 2009 in district Kurukshetra (Haryana).

According to Budgey (1994), in northern India, the nesting period may extend from May to August or even September due to high risk of predation resulting in last proportion of renesting. Musavi (2000) has reported the correlation of breeding season of peafowl with the emergence of adult insects and their subsequent breeding in monsoon months. The resultant increased insect populations form the major component of young chick diet.

In the present study, male peafowl were found displaying to attract the opposite sex (Plate 1) between mid May to mid June, 2009; the number of male displays varied from 1 to 17 per visit in SPWS, 3 to 14 per visit in BSRF and 2 to 27 per visit in JKAL (Fig. 2). Male-female pairing and subsequent nest building activities were witnessed between mid June to mid July, 2009 at all the three study sites in district Kurukshetra.

In all, 13 peafowl nests (4 in SPWS, 5 in BSRF and 4 in JKAL) were located after thorough scanning of the study sites. Of these, 10 nests were located inside the thick *Capparis sepiaria* thorny bushes with *Cyprus rotundus* grasses around; 2 nests were located in thick *Desmostachya bipinnata* grass and 1 nest was located in nearly fallow land (Plate 2). All the observed nests were built by the birds in small depressions on the ground using variety of materials in different proportions such as dry grass blades, dry bamboo leaves, *Delbergia* leaves, dry *Eucalyptus* leaves, detritus, petioles of leaves etc. (Table 1). Earlier, Budgey (1994) has recorded peafowl nests made of dried grass intermingled with dry twigs of *Prosopsis juliflora* in long grass/under dense bushes and occasionally in more exposed sites such as fairly short grass. In low lying areas, which frequently get submerged in rainy water, peafowl nests were observed at a height in crotch of banyan tree, *Ficus benghalensis* (Baker, 1930).

Various morphometric parameters of peafowl nests (position, depth, diameter and circumference) were recorded at all the three study sites in district Kurukshetra. Of all the 13 nests studied, 10 nests were located beneath thick thorny bushes, 2 nests were located in thick grasses and 1 nest was found in nearly fallow land. All these nests were viable nests. Depth of the nests varied from 4.70-7.30 cm with a mean of 6.20±1.08 cm in SPWS, 2.33-7 cm with a mean of 3.96±1.81 cm in BSRF and 2-4 cm with a mean of 3.25±0.95 cm in JKAL study site. Diameter of the nests also varied from a minimum of 20.57 cm to a maximum of 60 cm with a mean of 40.50±11.95 cm, 41.40±14.09 cm and 24.12±4.49 cm in SPWS, BSRF and JKAL study sites respectively. Circumference of nests too showed great variations; it varied from 87.92 172.70 cm (mean 127.17±37.54) in SPWS, 65.94-188.45 cm (mean 130.11±44.33 cm) in BSRF and 128.74-191.50 (mean 151.49±28.22 cm) in JKAL study site (Table 2).

Egg laying in peafowl was recorded from late July to mid August, 2009 in the present study. Different workers have reported variable clutch size of peafowl in different regions (Sharma,1972; Ali and Ripley, 1983; Budgey, 1994; Subramanian and John,2000). Peahens are normally single clutched, but there is always a high level of nest failure and early chick mortality in wild forcing them for renesting (De clinchap, 1982; Johansgaurd, 1986). Peafowls are capable of laying 3-4 clutches of decreasing size, if they are not permitted to incubate the eggs (Delacour, 1977). Modal clutch size of peafowl may range from 3-9 with an average modal clutch size of 6 (Sharma, 1972). According to Budgey (1994), clutch size varies from 1-12 (mean 4.885) and hens with larger clutches (more than 5 eggs) were always seen to start incubating by 5th to 6th egg. Variable clutch size of 3-8 (Ali and Ripley, 1983) and 3-6 (Subramanian and John, 2000), have also been earlier reported. In the present study, 2-6 creamy white or buff coloured eggs were seen in all the 13 studied nests (Fig. 3) with a mean of 3.53±1.19 eggs/nest. The clutch size of peafowl varied from 3-5 in SPWS, 2-6 in BSRF and 2-4 in JKAL study site respectively (Fig. 3) Each egg had thick, closely pitted shell (Plate 1). In different nests, egg laying by the females was done after a gap of approximate 48 hours. The egg volume varied in different clutches in all 13 nests (Table 3). The newly hatched chicks (Plate 2) were observed in mid September, 2009 in all the study sites.

REFERENCES

Ali S and Ripley S D (1983) *Hand book of birds of India and Pakistan*. Oxford University Press, Bombay.

Ali S and Ripley S D (1987) *Hand book of birds of India and Pakistan.* Oxford University Press, Bombay. 126

Anderson D J, Stoyan N C and Ricklefs R E (1987) Why are there no viviparous bird ? *Am. Nat*. **135,** 334-351

Budgey H V (1994) Parental strategies of Indian peahen. *Ph.D thesis.* Open University, U.K (unpublished)

Collias N E and Collias E C (1984) *Nest Building and Bird Behaviour. Princeton, N.J.*: Princeton University Press. 378-401

Dagar J C, Singh G and Singh N T (2001) Evaluation of Forest and Fruit Trees Used for Rehabilitation of Semiarid Alkali-Sodic Soils in India. *Arid Land Research and Management* **15**, 115-133.

de Clinchap T (1982) Sompteueux paons blancs. *Journal des Oiseaux* **157**, 133

Delacour J (1977) *The pheasants of world* (2nd edition). Spur publications in conjunction with the WPA

Gill F B (1994) *Nest and Incubation. Ornithology 2nd edition.* 375-400

Johansgaurd P A (1986) *Pheasants of the world*. Oxford university Press, Bombay.

Johansingh A J T and Murali S (1978) The ecology and behaviour of Indian Peafowl (*Pavo cristatus*) of Injar. *J. Bombay Natural History society* **75,**1069-1079

McGowan P (2002) The conservation implications of the hunting of Galliformes and the collection of their eggs the sustainable use of wild species for meat. IUCN, Gland, Switzerland and Cambridge, UK. 85–93

Musavi A H (2000) *Galliformes:* World Pheasant Association, Reading UK and King Mahendra STrust, Kathmandu, Nepal. 39-44

Petrie M, Halliday T and Sanders C (1991) Peahens prefers peacock with elaborate trains. *Animal Behaviour* 349-358

Sharma I K (1972) Etude ecologique de la reproduction du paon *Pavo cristatus*. *Alauda* **40,** 344-346.

Subramanian K S and John M C (2000) Roosting and nesting habits of free ranging Indian peafowl (*Pavo cristatus*) in southern Tamil Nadu. *Zoos´ Print Journal* **16,** 537-538

Thaker J P (1963) Peacock: the National bird of India. *Pavo* **1,**1-18

Yasmin S (1995) Charcteristics of tree used for roosting by blue peafowl in Aligarh district. India. *Ann. Rev. World Pheasant Assoc.* **49,** 57-63.