



Distribution and habitat preference of Grey Junglefowl *Gallus sonneratii* (Teminck, 1813) and Aravalli Red Spurfowl *Galloperdix spadicea caurina* (Blanford, 1898) in Kumbhalgarh Wildlife Sanctuary, Rajasthan, India

Sen Pankaj Kumar*, Meghwal Ramchandra and Bhatnagar Chhaya

Aquatic Toxicology and Wildlife Research Laboratory, Department of Zoology, University College of Science, Mohanlal Sukhadia University, Udaipur, Rajasthan, India
kumarsenpankaj86@gmail.com

Available online at: www.isca.in, www.isca.me

Received 4th November 2015, revised 24th February 2016, accepted 19th March 2016

Abstract

The Grey Junglefowl (GJF) is distributed throughout peninsular India while the Aravalli Red Spurfowl (RSF) is endemic to South Rajasthan. Data pertaining to distribution of fowls was collected from July, 2013 to June, 2015. Study was carried out using the Random survey and line transects methods. Presence of GJF was found within 19 of 34 forest blocks of the sanctuary, while RSF inhabits in 10 blocks only. They were found in blocks with denser vegetation and thorny shrubs with undulating rocky terrain.

Keywords: Kumbhalgarh Wildlife Sanctuary, Grey Jungle fowl, Aravalli Red Spur fowl, Dry Deciduous Forest, Group size.

Introduction

Birds like pheasants, partridges and quails are classified in Order Galliformes. The Family Phasianidae, in which the jungle fowls are categorized, includes the game birds which have also featured as important food item of man from time immemorial. The Grey Junglefowl (*Gallus sonneratii* Teminck, 1813) is distributed in peninsular India while the Aravalli Red Spur fowl (*Galloperdix spadicea caurina* Blanford, 1898) is endemic to southern Rajasthan.

The male Grey Jungle fowl is characterized by the long arching sickle-shaped tail and well developed comb while the female lacks the sickle on tail and is also devoid of the comb. Dorsally, it has dull blackish feathers while the breast has a white streak and brownish grey abdomen. The Aravalli Red Spurfowl is intermediate between Jungle fowls and Partridges in appearance.

The female has a partly ridge-like tail that is not laterally compressed while the wings are short and rounded. The male lacks the wattle or comb but has a patch of brick-red naked skin around eye and has two to four distinct pointed spurs on both legs¹. Both the fowls are found in Kumbhalgarh WLS in good numbers^{2,19}.

Rajasthan state is located in the western part of India and has two distinct ecological regions: The Thar Desert on the north-west and a comparatively greener south-east that are divided by Aravalli hill ranges. Although lots of studies have been carried out on various bird species, but work on jungle fowls in southern Rajasthan is scanty. Therefore the study has been

planned to assess distribution of both species in Kumbhalgarh WLS.

Study area: The study site, Kumbhalgarh WLS (73°15'E, 25°00'N to 73°45'E, 25°30'N) is situated in the part of western slopes of Aravalli hills varying from 275 to 1165m in altitude. Area of the sanctuary is 610 km² with 10.35 km² of protected forest and 599.65 km² is reserved forest, covering a diagonally shaped corridor. It lies approximately 80km far in the north of Udaipur city. The highest elevation is 1074m in Ranakpur. The temperature fluctuates according to weathers ranges from 2°C to 50°C. The average rainfall in study area is 720 mm (average of last two years).

The forest type-wise quantification shows a mosaic of thorn-mixed forest, dense dry deciduous forest with moist riverine green patches. The Sanctuary divided into 34 blocks, which administratively fall under four ranges.

The present study area has a mosaic of thorn-mixed forest, dense dry deciduous forest with moist riverine green patches. Accordingly, it is rich in thorny shrubs and trees such as *Zizyphus mauritiana*, *Phoenix sylvestris*, *Anogeissus pendula*, *Capparis decidua*, *Capparis sepiaria*, *Emblica officinalis*, *Lannea grandis*, *Boswellia serrata*, *Lantana camara*, etc. that are present abundantly.

These blocks also have the hilly terrain covered by grasses like *Sehimanur vosum*, *Dicanthium annulatum*, *Dendrocalamus strictus*, *Eremopogon foveolatus*, *Apludamutica*, *Heteropogon contortus* etc.

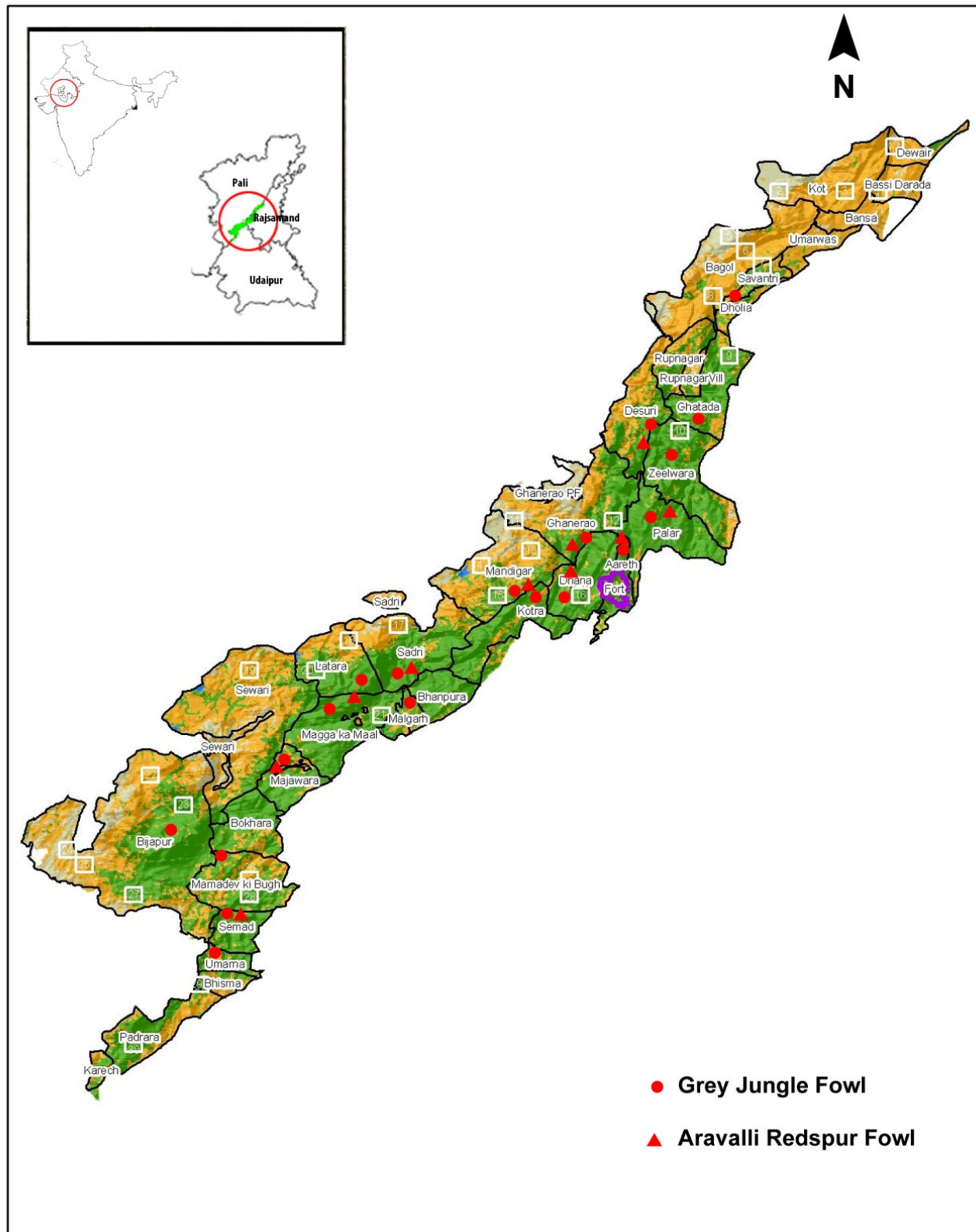


Figure-1

Satellite map of study area (KWLS) showing distribution of fowls; Inset showing location of KWLS on map of India



Figure-2
Grey Jungle fowl cock and hens



Figure-3
Aravalli Red Spur fowl male in study area

Methodology

Data was collected from July, 2013 to June, 2015. All the forest blocks in the sanctuary were scanned on foot. Line transects and random surveys methods were used for data collection. Study was carried out using Olympus binoculars, GPS and camera (Nikon D5000). The habitat of Kumbhalgarh Wildlife Sanctuary can be divided into three major types:

Grassland or barren land Sparse dry deciduous forest and Dense dry deciduous forest.

For convenience sake, the study area was considered as upper zone (approximately one third from the top of the hill), middle zone (the middle one third part of the hill slope), bottom zone (lower one third of the hill), valley and near human settlement. The upper zone has rocky type terrain covered with forest and tall trees while, the middle zone has rocky undulating terrain along with dense forest of tall trees and patches of grasses. The bottom zone has bamboo forest with trees, shrubs and grasses in rocky- sloping terrain. The habitat zone of valley comprises of sparse trees, shrubs, bamboo and other grasses present in flat and slope patches of much undulated terrain. Habitat around

human settlements at the periphery of sanctuary has undulated and flat terrain covered by few trees, shrubs, grass patches and fruit shrubs like berries.

Results and Discussion

A total of 62 surveys were carried out in the sanctuary in which GJF was observed by 112 direct sightings and 44 vocal evidences. In case of RSF, the direct sightings were lesser than GJF and they were seen on 66 occasions and 36 vocal evidences were collected from different forest blocks. Out of 34 forest blocks in the sanctuary, GJF was found to inhabit 19 blocks while presence of RSF was in 10 forests blocks only (Table-1).

Five forest blocks had common habitat for both species. The habitat of these forest blocks had dense vegetation that provided cover for the birds and the thorny shrubs checked the approach of predators. Figure-4a depicts the direct sightings and vocal evidences of GJF and ARF in the different zones of study area while Figure-4b shows the number of individuals of both species sighted during the course of study. The data analysis indicated that the most preferred site of fowls was undulated, flat, rocky terrain and shrub thorny forest land between the hills.

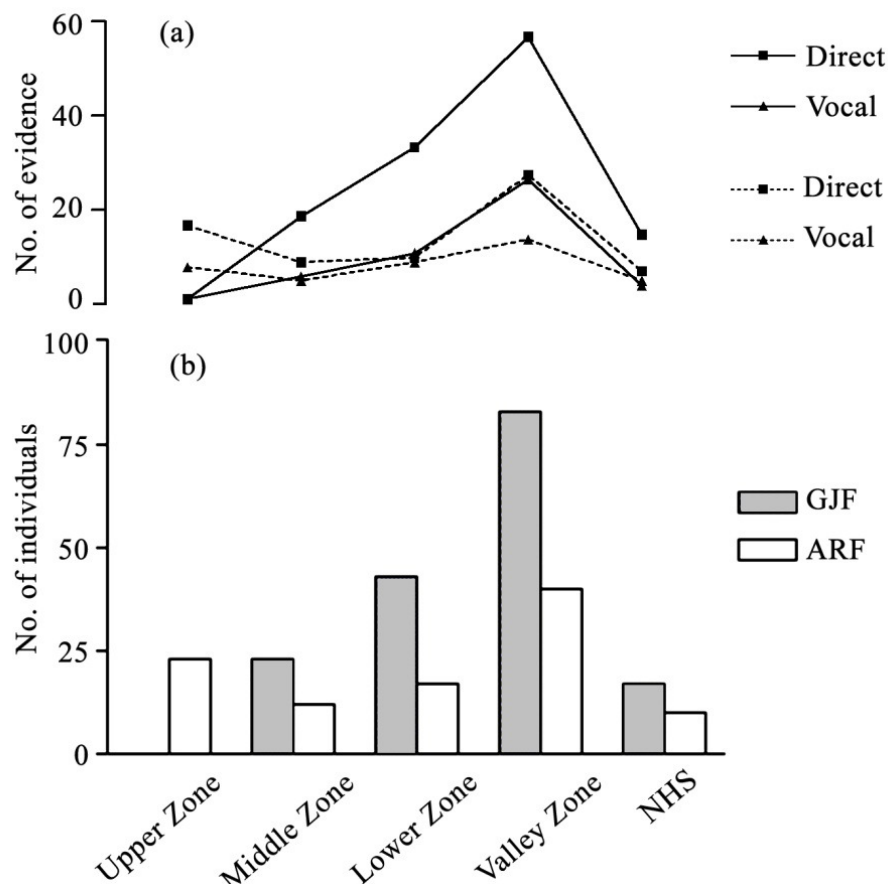


Figure-4

Observation pattern of GJF and ARF in the different zones of study area (a) showing evidence types of both species (b) showing distribution pattern of both species. Acronyms: NHS-Near human settlement

The Grey Junglefowl (*Gallus sonneratii*) is a widespread and distinctive game bird endemic to central and southern India²⁻⁵. It prefers scrub jungle, having mixed deciduous forest⁶⁻¹¹. Morejohn¹⁴ reported that the GJF inhabits a wide variety of habitats, from secondary dry deciduous to moist evergreen forests, but is especially common in bamboo thickets, edges of village forests around cultivated fields and around clearings or neglected plantations¹².

RSF is distributed in the Aravalli hills of Mt. Abu and Udaipur only^{13,14}. It ranges from south Rajasthan to the east Gujarat, and to the west of southeast Madhya Pradesh, and south-west Andhra, to throughout southern Peninsula. It is locally common in all types of forests, as well as thickets, abandoned plantations and forest, chiefly in the foothills, but can also be found up to 2400m height in the Nilgiris¹⁵.

In Rajasthan, this species is distributed in Bhomat area (Jhadol) and other parts of Udaipur district. It has also been reported from Kumbhalgarh, Todgarh-Raoli, Mt. Abu, Phulwari Ki-nal, Sajjangarh, and Sitamata Wildlife Sanctuaries¹⁶⁻¹⁷.

GJF was found to inhabit 19 out of 34 forest blocks of the sanctuary. Maximum group size of GJF was sighted during summer in the shrub of *Capparis sepiaria*, which consisted of two cocks, six hens and five chicks, but RSF inhabits into 11 blocks only. This group was observed in the valley of the sanctuary. The smallest group comprised of single individuals near the human settlement area.

Probably the individual had wandered there in search of food. This also indicates that the most preferred zone in the study area was valley that had sparse trees, shrubs, bamboo and other grasses. The literature also suggests that it prefers scrub jungle, having mixed deciduous forest with *Tectona grandis* and *Dendrocalamus strictus* with other common plants.

Maximum group size of RSF was sighted during summer season behind the shrub of *Lantana camara* and the group consisted of 2 cocks, 5 hens and 4 chicks. This group was seen in the middle zone of the sanctuary which had dense forest with tall trees and patches of grasses. RSF was also found on higher altitudes in Kumbhalgarh WLS, but in summer they came down to share habitat with GJF and other pheasants, due to food and water availability.

The smallest group size observed comprised of two individuals seen in the patches of grasses, forest trail at Chhoti audhi (Dhana block). The habitat here was rich in shrubs and tall grasses. Availability of shrubs and all kinds of grasses in middle zone and valley provides hiding places and variety of food items such as small seeds, fruits and insects from grasses. Thus, these zones provide a congenial habitat for both fowls.

Ten forest blocks had common habitat for both species. These ten blocks are Dhana, Areth, Palar, Sadari, Mandigarh, Ganerao, Desuri, Maggawada, Mamdev ki Bugh and Semud. The forest of these ten blocks is of dense Dry Deciduous type with moderately high diversity of trees dominated by *Anogeissus pendula*, *Anogeissus latifolia*, *Acacia senegal* shrubs like *Grewia flavescens*, *Lantana camara*, and patches of grasses like *Dendrocalamus strictus*, *Cynodon dactor*, *Aristida adscensionis* with pulpy and berry fruits in summers. This area also have the flow of seasonal rivers and a check dam. Most of the time, both species were found in valleys and lower zone of the sanctuary. The sightings of fowls were maximum seen in nalah (narrow seasonal stream), and nearby areas that seem to be their feeding ground with abundant food and grasses for hiding. Hence, both birds were preferred this kind of habitat.

The habitat is a mosaic of vegetation including *Lantana camara*, *Dendrocalamus strictus*, *Grewia flavescens*, *Capparis sepiaria*, *Aristida absiansionis*, etc. and big trees like *Anogeissus pendula*, *Anogeissus latifolia*, *Wrightia tinctoria*, *Acacia katechu*, *Zizyphus mauritiana*, *Butea monosperma*, *Boswellia serrata* and grasses like *Aristida adscensionis* var. *adscensionis*, *Cynodon dactylon* and *Eleocharis congesta*.

It was further observed that during the months of February to June, both species were sighted at the edge of dense forest near the human settlement area like agriculture fields and cattle grazing fields. These are the months of crop harvesting and preparing the field by ploughing for the next season. Thus, the fowl ventured there for food in early hours when there was less human activity. As the day progressed, human activity increased then they went back to denser areas of forest.

Conclusion

From the present study it can be concluded that the habitat of the sanctuary is congenial for both species. However, the habitat can be managed to improve so that the number of birds can be increased. Habitat improvement will also keep the birds within the sanctuary area and not wander close to human settlements where the hunting probability increased. The thorny shrubs can be increased as the birds prefer to make their nests and lay eggs beneath such shrubs.

Acknowledgment

Authors are thankful to the Department of Forests, Wildlife Division Udaipur for permitting to carry out this work. We also thank to Dr. Satish Kumar Sharma, A.C.F. Wildlife, Department of Forests, Udaipur and Dr. V.K. Koli, Assistant Professor, Department of Zoology, MLSU, Udaipur for their valuable suggestions on the manuscript.

Table-1
Presence of GJF and ARF in various forest blocks in Kumbhalgarh WLS

Block Name	Habitat	Presence of Fowl		Type of Evidence		Month of Sighting
		GJF	ARF	GJF	ARF	
Kotra	DDDF, Shrub land, tall grasses, some patches of SDF	✓		D,V		February- June
Dhana	DDDF, Shrub land, tall grasses	✓	✓	D,V	D,V	All months
Areth	DDDF, Shrub land, tall grasses	✓	✓	D,V	D,V	All months
Palar	DDDF, Shrub land, tall grasses	✓	✓	D,V	D,V	All months
Jilwara	DDDF, Shrub land, Tall Grasses	✓		D,V		February- June
Gathara	Shrub land	✓		V		February- June
Dholiya	DDDF, with Shrub land, SDDF, rocky patches	✓		V		February- June
Bijapur	Rocky land covers with DDF followed by SDF	✓		D		February- June
Latra	Light patches of DDF, maximum covered by SDF	✓		D		February- June
Sadari	DDDF, Shrubs, with tall grasses	✓	✓	D,V	D,V	All months
Mandigarh	SDF surrounded by DDDF	✓	✓	D,V	D,V	February- June
Ganerao	DDDF, Shrub land, tall grasses	✓	✓	D,V	D,V	All months
Desuri	DDDF, Shrubs, grasses patches, Rocky land covered SDF	✓	✓	D,V	D,V	All months
Mangarh	SDF mixed with DDF	✓		D,V		February- June
Magga ka mall	DDF	✓		D,V		All months
Maggawada	DDDF, Shrub land with SDF	✓	✓	D,V	D,V	February- June
Mamdev ki Bugh	DDDF, Shrub land with SDF	✓	✓	D,V	D,V	November- June
Umrana	DDF Shrub land with S.D.F.	✓		D,V		February- June
Semud	DDDF with light patches of SDF	✓	✓	D,V	D,V	February- June

Acronyms: KWLS= Kumbhalgarh Wildlife Sanctuary, GJF= Grey Junglefowl, ARF= Aravalli Red Spurfowl, D=Direct, V= Vocal. DDDF=Dense Dry Deciduous Forest, DDF= Dry Deciduous Forest, SDF= Sparse Deciduous Forest

References

1. Ali Salim and Ripley S. Dillion (2007). Handbook of The Birds Of India And Pakistan. Oxford University Press, Bombay. 2(2), 68-69, 106-109, ISBN-10-0-19-5659351-1.
2. Champion H.G. and Seth S.K. (1968), Revised forest types of India. Government of India, New Delhi, 404, ISBN10-818580516/13-97881580511
3. Collias N.E. and Collias E.C. (1967). A field study of the red jungle fowl in north-central India. *Condor*, 69, 360-68.
4. Delacour Jean (1960). The Pheasants of the World. Country life Limited London, Allen Publishing Company Salt Lake city U.S.A. 3, 103-120.
5. IUCN Red List (2012). <http://www.iucnredlist.org>. 5-6-2014.
6. Jaroli D.P., Mahawar M.M. and Vyas N. (2010). An ethnozoological study in the adjoining areas of Mount Abu wildlife sanctuary, India, *J. Ethnobiol. Ethnomed.* 6(6), 1.
7. Jathar G. and Rahmani A.R. (2006). Endemic Birds of India. Buceros Envis Newsletter: *Avian Ecol. Intl. Wetl.* 11(2 and 3), 12-13.
8. Johnsgard Paul A. (1986). The pheasants of the world. Oxford University Press, 1, 67-69, ISBN-10-01985571852/13-9780198571858.
9. Johnsingh A.J.T. and Joshua J. (1994). Avifauna in three vegetation types on Mundanthurai Plateau, South India. *J. Trop. Eco.*, 10(03), 323-335.
10. Johnsingh A.J.T., Martin N.H., Balasingh J. and Chelladurai V. (1987). Vegetation and avifauna in a thorn scrub habitat in South India. *J. Trop. Ecol.*, 28, 22-34.
11. Madge Steve and MCGowan Phill (2002). Pheasants, Partridges and Grouse, including Buttonquails, Sand grouse and Allies. Helm Identification Guides, Christopher Helm, London, 488, ISBN-10-0713639660
12. Morejohn G.V. (1968). Breakdown of isolation mechanisms in two species of captive junglefowl (*Gallus gallus* and *Gallus sonneratii*). *Evolution*, 576-582
13. Narasimmarajan K., Barman B.B. and Puia L. (2012). Population density and group size of the grey junglefowl *Gallus sonneratii* in the Melghat Tiger Reserve, Maharashtra, central India. *J. Threat. Taxa.*, 4(7), 2723-2726.
14. Sathyakumar S. (2006). Habitat use by Grey Junglefowl *Gallus sonneratii* Temminck at Mundanthurai Plateau, Tamil Nadu. *J. Bombay Nat. Hist. Soc.*, 103(1), 57.
15. Sharma Satish Kumar (2014). Faunal And Floral Endemism In Rajasthan, Himanshu publications, Udaipur Rajasthan. 1, 20-22, ISBN -978-81-7906-190-9.
16. Singh K.R. and Singh K.S. (2005). Pheasants of India and their Aviculture. Wildlife Institute of India, Dehradun, India
17. Tehsin R. (1990). Short communication on Jungle Cat: *Felis chaus* and Grey Junglefowl: *Gallus sonneratii*. *J. Bombay Nat. Hist. Soc.*, 87(1), 144.