



STUDY OF POPULATION AND DISTRIBUTION OF INDIAN PEAFOWL (*Pavo cristatus* L.) DURING COVID-19 IN PENGHORE (SAMAN), BHARATPUR RAJASTHAN.

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ABSTRACT

The COVID-19 pandemic and the subsequent lockdown imposed by the government in 2020-2021 also impacted the peafowl's ecology and behavior. This study aimed to compare the population and distribution of Indian peafowl in a specific site in Bharatpur, Rajasthan. This site is Village, Saman-Penghore in Tehsil Kumher, Bharatpur city, from September 2020 to August 2023. The results showed that the peafowl population increased significantly during the lockdown period at this site. The main reasons for the population increase and distribution expansion were reduced human disturbance, increased food availability, decreased poaching, and improved habitat quality. But after the Lockdown (in 2021-22, 2022-23), there was a progressive decrease in the population.

KEYWORDS: COVID-19, Distribution, *Pavo cristatus*, population, Bharatpur city

1. INTRODUCTION

The Indian peafowl, *Pavo cristatus* Linnaeus 1758 is a resident breeder of South Asia. The distribution of the peafowl in India is patchy but ranges from the Himalayas in the north to peninsular India in the south. They belong to the family Phasianidae of order Galliformes, which is a group of more than 250 bird species including peafowls, jungle fowls, pheasants, partridges, turkeys, grouse, chickens, quails, etc. (Johnsgard, 1986). The genus, *Pavo*, is derived from the Latin word *pawe*, meaning peacock, and the species name *cristatus*, refers to the crest (Sclater, 1860).

Interestingly, due to the lockdown by COVID-19, there is less interference of human beings with reduced noise and air pollution creating a favorable environment for avifauna. In the present study, the impact of lockdown on the population and distribution of Indian peafowl is assessed to understand the reduced human disturbance of birds.

Birds are the most essential part of our ecosystems and Indian Peafowl acts as a bioindicator of the changing climate (Nameer 2020). They are highly sensitive to changes in their environment *i.e.*, habitat destruction, and environmental pollution due to the activity of humans. Problems of bird survival are thus early warnings or signals of problems for man for their survival in nature. However, the Red Data Book of the International Union for Conservation of Nature (IUCN) listed that about one-third of species of pheasants are endangered. Therefore, peafowl are the most sensitive birds that live near the human population and may be used as a sign of environmental values (Ambuel and Temple, 1983). Henceforth, to assess the suitability of the environment, the present study has been designed on the population and distribution of Indian peafowl at

these sites. The abundance of bird species is largely influenced by the spatiotemporal distribution of some crucial environmental factors (Girma *et al.* 2017).

2. MATERIALS AND METHODS

2.1 Study area

The present study was carried out from September 2020 to August 2023. in Village Saman-Penghore in Tehsil Kumher Bharatpur District.

The location has a large area of agricultural fields with dense vegetation and water bodies.

2.2 Research Methodology

In the present study, the population of Indian peafowl, *Pavo cristatus*, was recorded at an experimental site, *i.e.* Saman village, The observations were recorded in the morning at every experimental site. The survey was carried out immediately after sunrise, normally from 06.00 to 09.00 am with a normal speed of walking. The survey was carried out throughout the year every week. The point transect method was used for the survey as suggested by Verner (1985). The movements of the birds were noted as precisely as possible to avoid pseudo-replication. Observations were taken with the help of binoculars, photography, and videography done by a Nikon d3500 DSLR Camera.

During observations, different developmental stages (sub-adult, male, male with train, and female) of Indian peafowl were also counted for population estimation (Johnsingh and Murali, 1978). The observations on the population of peafowl were recorded at five places at the experimental site. The statistical calculations were presented as mean values of the population with standard error of the mean (SE) in the tables.

3. RESULTS:

3.1. Population:

The population of Indian peafowl was recorded for three successive years (2020-21, 2021-22, and 2022-23) at three different places, which were Village Penghore-Saman, in Bharatpur district. At Village Penghore-Saman population of sub-adult males, males with train (TM), and females was recorded highest (14.00 ± 0.71 , 14.00 ± 0.71 , 18.00 ± 0.71 and 24.00 ± 0.71 individuals, respectively) in September 2020 during the experiment (Table 1). In contrast, the population of *P. cristatus* was recorded minimum of 1.00 ± 0.32 sub-adult, 1.00 ± 0.32 male, 4.00 ± 0.32 male with train, and 8.00 ± 0.45 female in June 2023, respectively (Table 3).

Table 1. The population of Indian Peafowl *Pavo cristatus* at village Penghore- Saman (Kumher) during year 2020-21

Month	Standard Week	Sub Adult	Male	Male with Train	Female	Total
September	36	14.00 ± 0.71	14.00 ± 0.71	18.00 ± 0.71	24.00 ± 0.71	70.00 ± 0.84
	37	14.00 ± 0.71	14.00 ± 0.89	18.00 ± 0.71	24.00 ± 0.71	70.00 ± 1.22
	38	13.00 ± 0.71	13.00 ± 0.71	17.00 ± 0.71	22.00 ± 0.71	65.00 ± 2.83
	39	13.00 ± 0.71	13.00 ± 0.71	16.00 ± 0.71	22.00 ± 0.71	64.00 ± 2.83
October	40	12.00 ± 0.71	12.00 ± 0.71	16.00 ± 0.71	22.00 ± 0.71	62.00 ± 2.76
	41	12.00 ± 0.71	12.00 ± 0.71	15.00 ± 0.71	20.00 ± 0.71	59.00 ± 2.76
	42	12.00 ± 0.71	10.00 ± 0.63	15.00 ± 0.71	20.00 ± 0.71	57.00 ± 2.39
	43	11.00 ± 0.71	10.00 ± 0.63	14.00 ± 0.71	20.00 ± 0.71	55.00 ± 1.90
November	44	11.00 ± 0.71	10.00 ± 0.63	14.00 ± 0.71	18.00 ± 0.71	53.00 ± 1.90
	45	10.00 ± 0.63	10.00 ± 0.63	12.00 ± 0.71	18.00 ± 0.71	50.00 ± 2.17
	46	10.00 ± 0.63	9.00 ± 0.61	12.00 ± 0.71	17.00 ± 0.71	48.00 ± 2.13
	47	9.00 ± 0.61	9.00 ± 0.55	12.00 ± 0.71	17.00 ± 0.71	47.00 ± 2.24
December	48	10.00 ± 0.63	9.00 ± 0.61	12.00 ± 0.71	16.00 ± 0.71	47.00 ± 2.13
	49	9.00 ± 0.61	8.00 ± 0.35	10.00 ± 0.63	15.00 ± 0.71	42.00 ± 1.47
	50	9.00 ± 0.61	8.00 ± 0.35	10.00 ± 0.63	15.00 ± 0.71	42.00 ± 1.47
	51	8.00 ± 0.35	7.00 ± 0.45	8.00 ± 0.35	14.00 ± 0.71	37.00 ± 0.84
January	52	8.00 ± 0.35	7.00 ± 0.45	8.00 ± 0.35	14.00 ± 0.71	37.00 ± 0.84
	1	8.00 ± 0.35	6.00 ± 0.32	6.00 ± 0.45	12.00 ± 0.71	32.00 ± 0.80
	2	6.00 ± 0.32	6.00 ± 0.32	6.00 ± 0.45	8.00 ± 0.35	26.00 ± 1.28
	3	6.00 ± 0.45	5.00 ± 0.32	4.00 ± 0.32	6.00 ± 0.45	21.00 ± 1.10
	4	5.00 ± 0.32	4.00 ± 0.32	2.00 ± 0.32	4.00 ± 0.32	15.00 ± 0.32

	5	5.00±0.32	4.00±0.32	3.00±0.32	6.00±0.45	18.00±0.55
February	6	7.00±.35	5.00±.32	6.00±.45	8.00±0.35	26.00±1.14
	7	7.00±0.35	6.00±0.45	7.00±0.35	10.00±0.63	30.00±1.38
	8	8.00±0.35	6.00±0.45	8.00±0.35	12.00±0.71	34.00±0.84
	9	9.00±0.61	7.00±0.35	9.00±0.61	14.00±0.71	39.00±1.53
March	10	9.00±0.61	8.00±0.35	9.00±0.61	16.00±0.71	42.00±1.53
	11	11.00±0.71	8.00±0.35	10.00±0.63	16.00±0.71	45.00±1.32
	12	12.00±0.71	10.00±0.63	10.00±0.45	17.00±0.71	49.00±2.12
	13	12.00±0.71	10.00±0.63	10.00±0.45	15.00±0.71	47.00±2.12
April	14	10.00±0.63	10.00±0.63	10.00±0.45	16.00±0.71	46.00±2.02
	15	12.00±0.71	10.00±0.63	12.00±0.71	16.00±0.71	50.00±2.35
	16	14.00±0.71	9.00±0.61	12.00±0.71	18.00±0.71	53.00±2.48
	17	12.00±0.71	9.00±0.61	13.00±0.71	20.00±0.71	54.00±2.48
May	18	11.00±0.71	9.00±0.61	11.00±0.71	20.00±0.71	51.00±2.08
	19	11.00±0.71	9.00±0.61	10.00±0.63	18.00±0.71	48.00±1.80
	20	10.00±0.63	8.00±0.35	10.00±0.45	16.00±0.71	44.00±1.50
	21	10.00±0.63	8.00±0.35	9.00±0.61	14.00±0.71	41.00±1.47
	22	9.00±0.61	6.00±0.32	9.00±0.61	12.00±0.71	36.00±1.92
June	23	8.00±0.35	5.00±0.32	8.00±0.35	10.00±0.63	31.00±0.89
	24	6.00±0.45	2.00±0.32	8.00±0.35	10.00±0.63	26.00±1.07
	25	5.00±0.45	2.00±0.32	5.00±0.32	7.00±0.45	19.00±1.30
	26	3.00±0.32	2.00±0.32	4.00±0.32	9.00±0.61	18.00±1.28
July	27	4.00±0.32	4.00±0.32	4.00±0.45	10.00±0.63	22.00±1.30
	28	8.00±0.35	6.00±0.45	8.00±0.35	14.00±0.71	36.00±0.84
	29	10.00±0.63	8.00±0.35	10.00±0.63	16.00±0.71	44.00±1.80
	30	10.00±0.63	8.00±0.35	12.00±0.71	18.00±0.71	48.00±1.66
August	31	11.00±0.71	10.00±0.63	12.00±0.71	18.00±0.71	51.00±1.92
	32	12.00±0.71	10.00±0.63	14.00±0.71	20.00±0.71	56.00±2.35
	33	12.00±0.71	10.00±0.63	14.00±0.71	20.00±0.71	56.00±2.39
	34	13.00±0.71	11.00±0.71	15.00±0.71	22.00±0.71	61.00±2.02
	35	14.00±0.71	12.00±0.71	16.00±0.71	24.00±0.71	66.00±2.77

Table 2. Population of Indian Peafowl *Pavo cristatus* at village Penghore- Saman (Kumher) during year 2021-22

Month	Standard Week	Sub Adult	Male	Male with Train	Female	Total
September	36	12.00±0.71	11.00±0.71	16.00±0.71	22.00±0.71	61.00±2.07
	37	12.00±0.71	11.00±0.71	16.00±0.71	22.00±0.71	61.00±2.07
	38	10.00±0.45	10.00±0.71	15.00±0.71	21.00±0.71	56.00±1.22
	39	11.00±0.71	10.00±0.45	15.00±0.55	20.00±0.71	56.00±1.34
October	40	10.00±0.45	11.00±0.71	14.00±0.71	20.00±0.71	55.00±1.58
	41	10.00±0.45	10.00±0.55	14.00±0.71	2.00±0.71	54.00±1.10
	42	10.00±0.45	9.00±0.61	13.00±0.71	18.00±0.71	50.00±1.53
	43	9.00±0.61	8.00±0.35	12.00±0.71	18.00±0.71	47.00±1.50
	44	9.00±0.61	8.00±0.35	12.00±0.71	17.00±0.71	46.00±1.50
November	45	8.00±0.35	7.00±0.35	11.00±0.71	17.00±0.71	43.00±0.89
	46	8.00±0.35	7.00±0.35	10.00±0.45	16.00±0.71	41.00±0.89
	47	9.00±0.61	6.00±0.42	10.00±0.45	16.00±0.71	41.00±0.97
	48	8.00±0.35	6.00±0.42	10.00±0.45	15.00±0.71	39.00±0.60
December	49	8.00±0.35	5.00±0.32	9.00±0.61	14.00±0.71	36.00±0.81
	50	7.00±0.35	5.00±0.32	9.00±0.61	14.00±0.71	35.00±0.81
	51	7.00±0.35	5.00±0.32	8.00±0.35	12.00±0.71	32.00±0.32
	52	7.00±0.35	6.00±0.42	8.00±0.35	12.00±0.71	33.00±0.49
January	1	6.00±0.42	5.00±0.32	7.00±0.35	10.00±0.45	28.00±0.68
	2	5.00±0.32	4.00±0.32	5.00±0.32	8.00±0.35	22.00±0.73
	3	5.00±0.32	3.00±0.32	4.00±0.32	8.00±0.35	20.00±0.49
	4	4.00±0.32	2.00±0.32	2.00±0.32	7.00±0.32	15.00±0.86
	5	4.00±0.32	2.00±0.32	3.00±0.32	8.00±0.35	17.00±0.80
February	6	6.00±0.42	3.00±0.32	5.00±0.32	10.00±0.45	24.00±0.80
	7	6.00±0.42	4.00±0.32	6.00±0.42	12.00±0.71	28.00±1.64
	8	8.00±0.35	5.00±0.32	7.00±0.35	12.00±0.71	32.00±0.32
	9	8.00±0.35	5.00±0.32	8.00±0.45	14.00±0.71	35.00±0.73
March	10	8.00±0.35	5.00±0.32	9.00±0.61	15.00±0.71	37.00±0.81
	11	10.00±0.45	6.00±0.42	9.00±0.61	14.00±0.71	39.00±0.97
	12	10.00±0.45	7.00±0.35	10.00±0.55	15.00±0.71	42.00±1.11
	13	11.00±0.71	7.00±0.35	10.00±0.55	15.00±0.71	43.00±1.16
April	14	10.00±0.45	8.00±0.35	9.00±0.61	16.00±0.71	43.00±0.87
	15	12.00±0.71	8.00±0.35	9.00±0.61	16.00±0.71	45.00±1.50

	16	12.00±0.71	9.00±0.61	12.00±0.71	18.00±0.71	51.00±2.37
	17	13.00±0.71	9.00±0.61	11.00±0.71	18.00±0.71	51.00±2.06
May	18	12.00±0.55	8.00±0.35	12.00±0.71	16.00±0.71	48.00±1.50
	19	10.00±0.45	10.00±0.55	11.00±0.71	15.00±0.71	46.00±1.22
	20	10.00±0.55	9.00±0.61	10.00±0.45	14.00±0.71	43.00±1.11
	21	8.00±0.35	9.00±0.61	10.00±1.45	14.00±0.71	41.00±0.87
	22	8.00±0.35	8.00±0.45	9.00±0.61	12.00±0.71	37.00±0.87
June	23	6.00±0.42	5.00±0.32	9.00±0.61	10.00±0.45	30.00±0.49
	24	4.00±0.32	3.00±0.32	8.00±0.35	12.00±0.71	27.00±0.66
	25	2.00±0.32	3.00±0.32	8.00±0.35	10.00±0.63	23.00±0.73
	26	1.00±0.32	2.00±0.32	7.00±0.35	10.00±0.45	20.00±0.97
July	27	3.00±0.32	4.00±0.32	7.00±0.35	14.00±0.71	28.00±0.66
	28	6.00±0.42	5.00±0.32	9.00±0.61	15.00±0.71	35.00±1.20
	29	8.00±0.63	6.00±0.42	10.00±0.45	16.00±0.71	40.00±1.07
	30	8.00±0.35	7.00±0.35	11.00±0.71	16.00±0.71	42.00±0.89
	31	7.00±0.35	8.00±0.35	12.00±0.71	18.00±0.71	45.00±1.05
August	32	8.00±0.35	8.00±0.45	12.00±0.71	18.00±0.71	46.00±1.16
	33	8.00±0.35	9.00±0.61	12.00±0.71	20.00±0.71	49.00±1.63
	34	10.00±0.45	9.00±0.61	14.00±0.71	20.00±0.71	53.00±1.98
	35	10.00±0.45	9.00±0.61	14.00±0.71	22.00±0.71	55.00±1.53

Table 3. Population of Indian Peafowl *Pavo cristatus* at village Penghore- Saman (Kumher) during the year 2022-23

Month	Standard Week	Sub Adult	Male	Male with Train	Female	Total
September	36	8.00±0.35	8.00±0.45	12.00±0.71	20.00±0.71	48.00±0.97
	37	8.00±0.35	9.00±0.61	12.00±0.71	20.00±0.71	49.00±1.53
	38	9.00±0.61	8.00±0.35	12.00±0.71	18.00±0.71	47.00±1.53
	39	8.00±0.35	8.00±0.45	10.00±0.45	19.00±0.71	45.00±1.16
October	40	8.00±0.35	7.00±0.35	10.00±0.55	18.00±0.71	43.00±0.71
	41	7.00±0.35	7.00±0.35	10.00±0.71	18.00±0.71	42.00±0.71
	42	7.00±0.35	7.00±0.35	11.00±0.71	19.00±0.71	44.00±1.05
	43	7.00±0.35	6.00±0.32	10.00±0.37	18.00±0.71	41.00±1.14
	44	6.00±0.32	6.00±0.32	10.00±0.55	16.00±0.71	38.00±1.64
November	45	6.00±0.32	6.00±0.32	9.00±0.61	16.00±0.71	37.00±1.56
	46	6.00±0.32	5.00±0.32	9.00±0.61	14.00±0.71	34.00±1.39
	47	5.00±0.32	5.00±0.32	8.00±0.35	14.00±0.71	32.00±0.80
	48	6.00±0.32	5.00±0.32	9.00±0.61	15.00±0.71	35.00±1.02
December	49	5.00±0.32	5.00±0.32	8.00±0.35	16.00±0.71	34.00±0.80
	50	4.00±0.32	4.00±0.32	8.00±0.35	14.00±0.55	30.00±0.37
	51	3.00±0.32	4.00±0.32	8.00±0.35	14.00±0.55	29.00±0.37
	52	2.00±0.32	4.00±0.32	7.00±0.35	12.00±0.55	25.00±0.49
January	1	2.00±0.32	4.00±0.32	7.00±0.35	10.00±0.32	23.00±0.45
	2	3.00±0.32	3.00±0.32	6.00±0.32	10.00±0.45	22.00±0.84
	3	2.00±0.32	1.00±0.32	5.00±0.32	9.00±0.61	17.00±1.11
	4	1.00±0.32	1.00±0.32	4.00±0.32	8.00±0.45	14.00±0.84
	5	2.00±0.32	2.00±0.32	3.00±0.32	8.00±0.45	15.00±0.55
February	6	5.00±0.32	3.00±0.32	5.00±0.32	9.00±0.61	22.00±1.11
	7	5.00±0.32	4.00±0.32	6.00±0.32	10.00±0.45	25.00±0.32
	8	4.00±0.32	4.00±0.32	6.00±0.32	10.00±0.45	24.00±0.55
	9	4.00±0.32	5.00±0.32	7.00±0.35	11.00±0.71	27.00±0.58
March	10	4.00±0.32	4.00±0.32	7.00±0.35	11.00±0.71	26.00±0.58
	11	5.00±0.32	4.00±0.32	7.00±0.35	12.00±0.55	28.00±0.58
	12	4.00±0.32	5.00±0.32	8.00±0.35	12.00±0.55	29.00±0.58
	13	4.00±0.32	5.00±0.32	8.00±0.35	13.00±0.71	30.00±0.86
April	14	4.00±0.32	5.00±0.32	9.00±0.45	14.00±0.55	32.00±0.84
	15	4.00±0.32	6.00±0.32	8.00±0.35	14.00±0.55	32.00±0.20
	16	4.00±0.32	5.00±0.32	9.00±0.61	15.00±0.71	33.00±1.369
	17	3.00±0.32	6.00±0.32	9.00±0.61	16.00±0.71	34.00±1.36
May	18	4.00±0.32	4.00±0.32	8.00±0.35	16.00±0.71	32.00±1.11
	19	4.00±0.32	4.00±0.32	8.00±0.35	14.00±0.71	30.00±1.11
	20	3.00±0.32	4.00±0.32	7.00±0.35	13.00±0.71	27.00±0.73
	21	3.00±0.32	4.00±0.32	8.00±0.35	13.00±0.71	28.00±0.66
June	22	2.00±0.32	3.00±0.32	7.00±0.35	12.00±0.55	24.00±0.66
	23	2.00±0.32	2.00±0.32	7.00±0.35	10.00±0.45	21.00±0.80
	24	2.00±0.32	2.00±0.32	6.00±0.32	10.00±0.45	20.00±0.77
	25	1.00±0.32	1.00±0.32	5.00±0.32	9.00±0.61	16.00±0.49
	26	1.00±0.32	1.00±0.32	4.00±0.32	8.00±0.45	14.00±0.55

July	27	3.00±0.32	2.00±0.32	3.00±0.32	9.00±0.61	17.00±0.80
	28	4.00±0.32	3.00±0.32	3.00±0.32	10.00±0.45	20.00±0.45
	29	5.00±0.32	4.00±0.32	5.00±0.32	12.00±0.55	26.00±0.55
	30	5.00±0.32	5.00±0.32	6.00±0.32	13.00±0.71	29.00±0.89
	31	6.00±0.32	6.00±0.32	6.00±0.42	15.00±0.71	33.00±1.46
August	32	7.00±0.35	6.00±0.42	7.00±0.45	15.00±0.71	35.00±0.87
	33	7.00±0.35	7.00±0.35	7.00±0.45	16.00±0.71	37.00±0.89
	34	8.00±0.35	7.00±0.35	8.00±0.45	16.00±0.71	39.00±0.89
	35	8.00±0.35	8.00±0.45	8.00±0.45	16.00±0.71	40.00±1.02

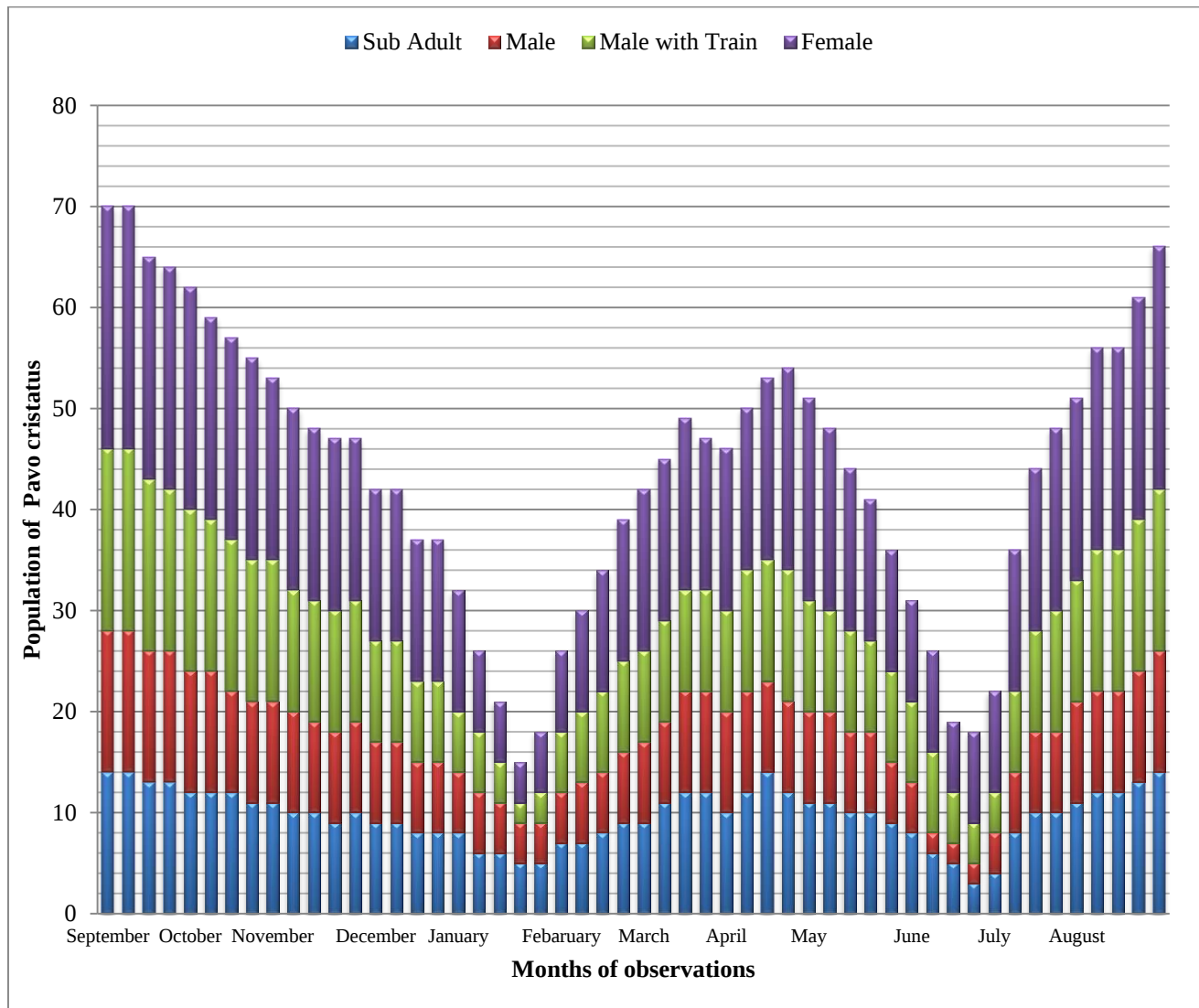


Fig.1 Population of Indian Peafowl at Saman (Kumher) during the year 2020-21

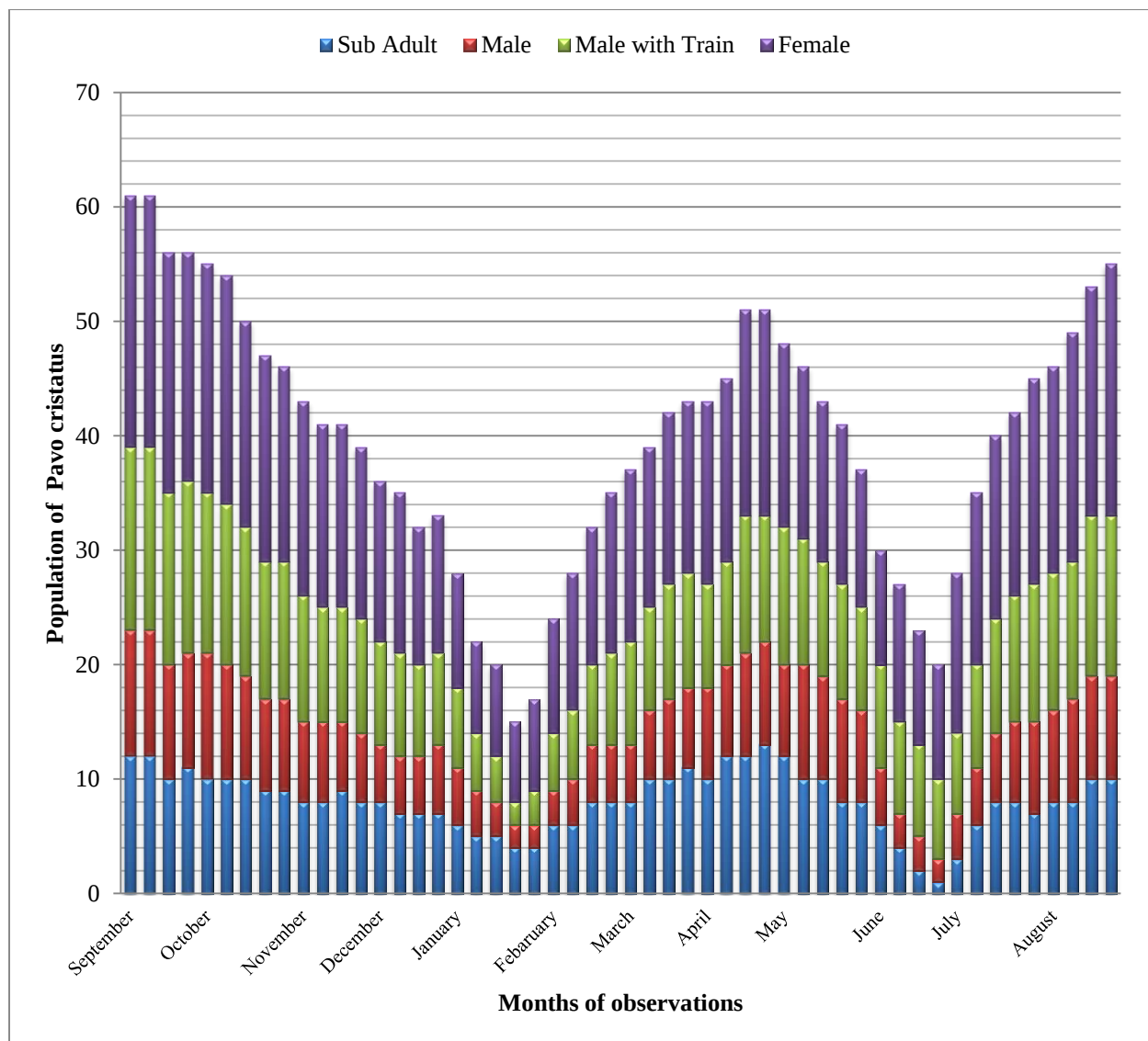


Fig. 2. Population of Indian Peafowl at village Penghore (Kumher) during year 2021-22

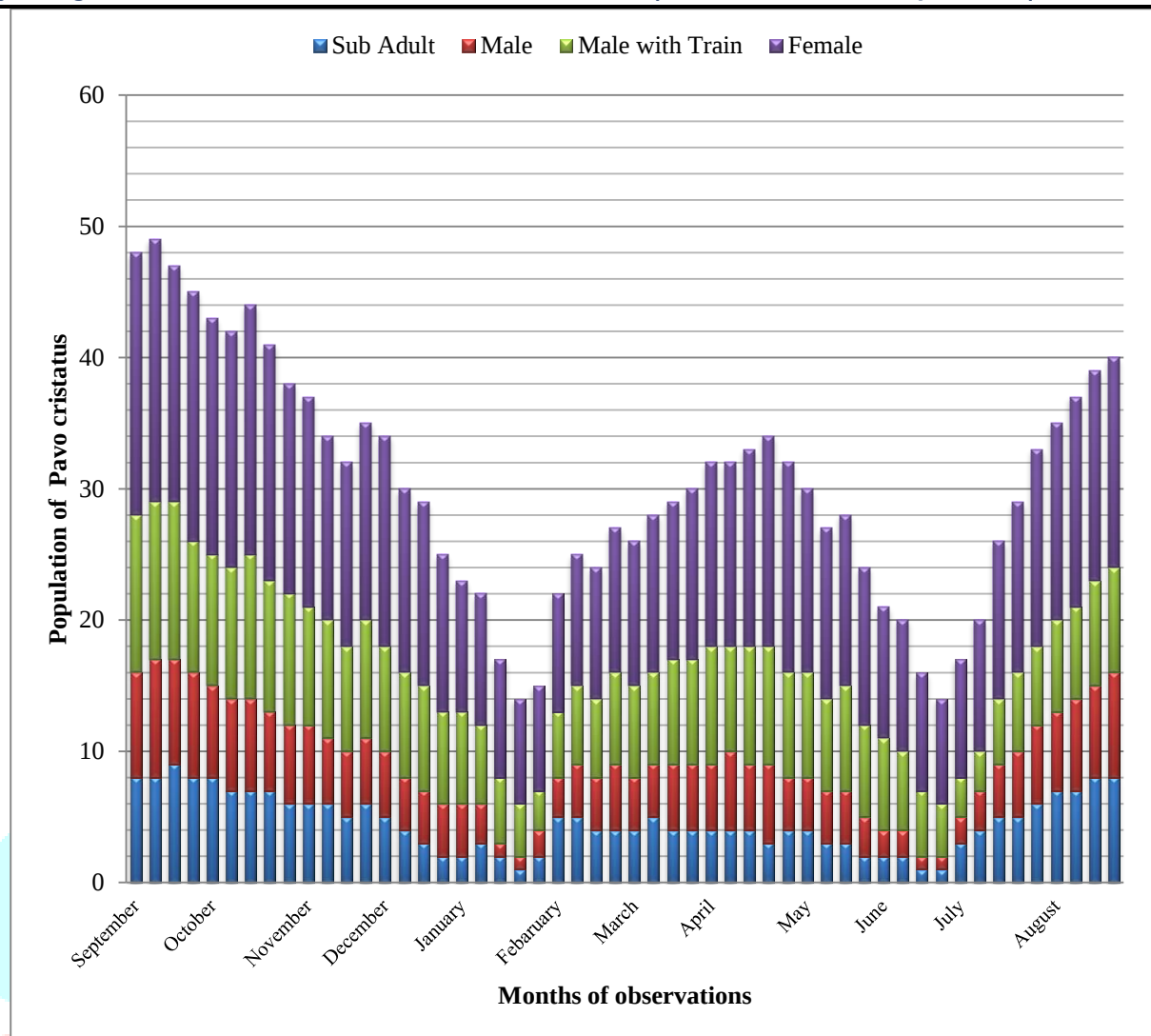


Fig. 3. Population of Indian Peafowl at village Penghore (Kumher) during year 2022-23

3.2. Distribution:

As far as distribution was concerned, among different locations, Indian peafowl, *Pavo cristatus* attained maximum values as 24.00 ± 0.71 female, followed by 18.00 ± 0.71 male with train, 14.00 ± 0.71 male, and 14.00 ± 0.71 sub-adult at Village Penghore-Saman.



Figure 1- Indian Peafowl Roosting on a tree

4. DISCUSSION:

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, prompted governments worldwide to impose lockdowns and travel restrictions in early 2020 to curb the spread of the virus. These lockdowns led to profound changes in human behavior and reduced human disturbances, such as industrial activity, transportation, and tourism, during the lockdown period resulting in a notable increase in Peafowl numbers. Therefore the number of Peafowl at every site was high during the lockdown period (2020-21) and remained statistically low in 2021-22 and 2022-23. Similar observations were recorded by Madhok and Gulati (2022) who studied that Avian species reclaimed urban habitat during India's COVID-19 lockdown there was a 16% increase in the number of bird species during the lockdown in the 20 most populous cities in India.

The findings on population status and distribution pattern of Indian peafowl *P. cristatus* L. in district Bharatpur revealed that peafowl are distributed in both natural and man-made environments (crop fields and colonies). The highest number of peafowl was recorded in the month of September. In September, most of the peafowl come out to search for suitable sites for their mating and reproduction. This hypothesis was considered by Yasmin (1995), Yasmin and Yahya (1996), Mateos (1998), Deeming and Wadland (2002), and Harikrishnan et al. (2010).

In contrast, a minimum population was observed in the month of June possibly due to increased temperature. This population and distribution variation is attributed to their habitat and living style. Similar observations were recorded by Ramesh (2003) at Great Himalaya National Park, in Western Himalaya, and also by Das and Sivakumar (2009) at Chilla Raiyge, Rajaji National Park, in North India.

The predation pressure and local people disturbances could cause the peafowl to concentrate in a particular area for foraging. Generally, the peafowls were observed and recorded from the agricultural fields and also from the areas inhabited by tall shrubby trees. It is because by the fact that the shrubby trees provide shade and the agricultural fields are the source of their feed.

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