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Effect of Lantana Removal on Grouping Pattern of Chital Deer from Hathidagar Ecotourism Zone of Corbett National Park (Uttarakhand) India

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ABSTRACT

Hathidagar and Phato ecotourism zones are the newly opened zones in Corbett National Park. These zones are becoming quite popular among tourists as the online and offline entry for gypsy safari here is getting full every day. This study has revealed the effect of the presence and removal of Lantana shrub on the population (group size) of Chital deer inside Hathidagar Forest. In this study, groups of Chital deer have been observed starting from January 2023, before the Hathidagar forest became an ecotourism zone, and till April 2025 (28 months) after the Hathidagar forest became an ecotourism zone. Chital are found feeding in grasslands most of the year but when the grass dries up, they feed in shrubland also. In 2023, Lantana was found in the form of boundaries in grassland and shrubland, at that time large groups of Chital used to complete their feed by continuing their feed in between 1 to 2 hours, and the feed frequency was 3-4 times only. After the removal of Lantana in 2024 and 2025, the groups of Chital breaks into small groups due to the absence of a Lantana boundary, and their feeding also gets disturbed. So, the feed frequency is obtained 4-5 times to complete the feed. Along with this, the chances of a Chital or a Tiger chasing a Chital coming to the roadside have also increased, due to which the risk of human-wildlife conflicts has increased. Hence, after this study, the direct effect of Lantana on the group size of Chital can also be added to the economic importance of Lantana.

Keywords: Hathidagar Ecotourism zone, Allelopathic effect, Humidity, Niche, Tape root system, gypsy-Safari, Feeding Frequency.

INTRODUCTION

Corbett National Park does not need any introduction as it is famous worldwide for its large fauna and flora (existing in its natural habitat). There is a remarkable population of more than 250 Tigers (Bengal Tigers) (Bargali, 2023). Hathidagar forest is a part of the reserve forest from Tarai-West Forest Division Ramnagar (Uttarakhand) India. Hathidagar Ecotourism Zone is the newly inaugurated zone (7th March 2024) from Corbett National Park (Uttarakhand) India. Since Hathidagar forest is directly connected with the Dhela and Phato Ecotourism zone of Corbett National Park, this forest is blessed with the fauna of Corbett Park by the presence of large mammals like Tiger, Leopard, Elephant, Sloth Bear, Jackal, Wild Dog, Wolves, Squirrels, Peacocks, Mongoose with herbivores i.e., Chital, Sambar, Barking, and Hog with many types of birds species like Peacock, Red Jungle Fowl, and Reptiles like Cobra, Snakes, Turtles etc. (Shalini & Pant, 2018).

Hathidagar zone has different types of vegetative areas for animals to reside in which includes Grassland, Saugon forest, Eucalyptus Forest, Sal Forest, Mixed tree forest (Semal, Rohini, and Khair tree), Shrub area (i.e., Lantana, Ber, Bhanua, Kari patta, and Peelu), artificial water ponds and riverside area. So, wild animals get sufficient food, shelter, and protection from predators (i.e. Tiger, Leopard, Jackal, wild dogs, Pythons, and any anthropogenic activity) as they are required for their realized niche. Due to the availability of different habitats, it is seen that Chital groups feed on different vegetative areas according to season and also it can be conditional (Shalini & Pant, 2023) and according to its habitat utilization (Mishra, 1982).

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Lantana, known as an invasive alien species (Negi, et al.2013) and non-native shrub species (native to South America (Gusha, et al.2016) found in most of the shrubland area of Corbett National Park and its adjacent forest (roadside). Lantana has a broad geographical distribution due to its survival against drought (Gusha, et al.2016), various types of soil, survival in less water/moisture in the soil, spiny leaves and shoots, and pungent smell (Negi, et al.2013). Although, Lantana is mostly known for its negative role in the forests as an allelopathic effect (Heirro & Callaway, 2003), toxic to most animals (Negi, et al.2013) and promoting fire hazards (Hiremath & Sundaram, 2005).

Lantana is also used as food by cattle (Gusha, et al.2016), herbivores (Chital & Sambar deer), and birds (seed eaters) during dry season (food scarcity). Lantana is used as an herbal medicine (Srivastava, et al., 2020) and also for its antimicrobial, fungicidal, insecticidal, and nematicidal activity (Begum et al., 2000; Day et al., 2003; Girish, 2017). Lantana removal work will be completed in 2024 from Corbett and Tarai-West Forest Division Ramnagar.

Chital deer (Axis axis, Erxleben 1777) were found in large herds of females with males and their babies in the grassland of Corbett Park. A change was found in the grouping pattern of Chital deer after removing Lantana from the Hathidagar forest.

In Ramnagar block of district Nainital, the connecting road Ramnagar to Maldhan village passes through Hathidagar forest. In this forest, Lantana bushes were seen as the boundary between the tracks of human vehicles and the wild animals like Tiger, Elephant, Python, Deer, etc. Lantana has a most significant role in this forest as these bushes act as a barrier between humans and wild animals (mainly Chital deer), due to which the herd of Chital feels safe from human beings. Even when vehicles are passing through the jungle paths or when humans get down from their vehicles to see the animals or to take photos or make videos, Lantana is present there like a barrier wall between the Chital group and human beings. In the presence of the Lantana barrier, the group of Chital feeds in the grassland and returns to their niche only after completing their feeding time. During grazing, only 1-2 healthiest males are keeping an eye on the predators while the rest of the members concentrate on their feed.

Lantana is considered to be one of the major reasons for spreading the forest fires. It is believed to reduce moisture/humidity in the soil and not allow other nearby plants to survive (Fan et al., 2010). At present, Lantana bushes are being out and removed to protect Corbett and the surrounding forest from forest fire during the study period (2023-2024).

Therefore, Lantana has been removed from Hathidagar as well, due to which a change has been observed in the herd size of Chital. In the study in 2023, large groups of Chital were found in the grassland of Hathidagar while in 2024 the group size of Chital found is small because the boundary of Lantana has been removed from the grassland. Due to the removal of Lantana bushes, the Chital does not get bushes of its height to hide from predators and on seeing a vehicle like gypsy, Car, Bike Bus, etc., coming frequently on the roadside, all the members have to immediately run away and go to their niche (core area /dense area). Due to the above reason, the feeding time of Chital is reducing and small groups are found scattered in different areas of the forest.

Objective of The Study

To study the effect of Lantana removal on the grouping pattern of Chital deer in the Hathidagar Ecotourism zone of Corbett National Park.

Materials And Method

The direct observation method was used to count the group size of Chital deer in the Hathidagar forest zone for primary data collection.

Study Area

Hathidagar is a forest zone from Tarai-West Forest Division Ramnagar (Uttarakhand) India. It is established as an Ecotourism Zone of Corbett Park (buffer area) on 7th March 2024. The latitude and longitude are 29'25'39.4"N

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and 79'07'41.6"E respectively and its area is about 35 sq. km. In Hathidagar, 25 gypsies are allowed for safari in morning and evening shift for Indian and Foreign tourists (Hathidagar, 2024). The main source of water is the Dhela River arriving from Corbett through Sawaldey village in Ramnagar.

Vegetation

Sal, Semal, Rohini, Dhak, Shisham, and Khair is abundant tree species with shrubs of Lantana camara (Kuri), Jungli Pudina (Chickweed), Bhanua, Kari Patta and Peelu. Some monsoon creepers and climbers are also found in this area spread on dry bushes of Kuri. Lantana (Red-Orange flower) is the most abundant shrub spread near the grassland area. These shrubs made a boundary/barrier to the wild animals and tourists during their visits. In the grassland area, mainly Dub, Sawai, Sirav, Kush, Khas, Crab, Narkul, Kumeria, Munja, Sarkanda, etc. are most abundant in Corbett Park (Shalini & Pant, 2018). Saugon and Eucalyptus tree plantation is seen in the maximum roadside area of Hathidagar forest (outside of the core zone of Corbett Park).

Plant Description

Lantana camara known as Kuri bushes in the local language, is a shrub species, a member of the family Verbenaceae (Negi, et al.2013). The woody stems and branches are loaded with green parallel leaves (leaflet length 5.5-6.0cm) and inflorescence with red, yellow, and orange colour petals (found in abundance in the Hathidagar forest). The fruits are green seeds (unripe) which turn to black-blue fruits (ripen). The number of buds is 33-35 and the number of petals is 20-22 while the number of green seeds produced is 10-15 which turns black and blue in each flower. The root system is shallow type which penetrates up to a depth of 0.2 meters from the upper portion of the main tape root and also spreads horizontally in the topsoil (Babu, et al., 2009).

Data Collection

The number of herds and total number of Chital deer are counted in three years of study (from April 2022 to April 2025). The field visits were done every 15 days in a month. The Line transect method was used to count the total number of Chital deer during field visits. The animal is captured from a distance between 5-50 feet (approx.) with the help of a binocular (Pantax s1050 S-series S P WP) and a mobile phone with camera high resolution (50MP). All the Chital deer found within 1 square kilometer have been counted in one group. The counting started from the roadside of Maldhan to Hathidagar (Maldhan to Ramnagar road) and Maldhan to Peerumadara (via Gate no.64 road), Natthawali, Hathidagar to Kumbhgadar Khatta, Patrani Vangram and Daphot village along with Dhela river.

The review of previously published work from online journals and Corbett National Park's official websites is done for secondary data regarding this topic.

RESULTS AND DISCUSSION

In the Hathidagar ecotourism zone, some changes are found in the Chital deer's group size and feeding time with the presence and absence of the Lantana shrub. These changes are seen in the Table number 1 and 2 and graph no.1(from January 2023 to April 2025).

Table 1. Monthly Group size of Chital deer found in Hathidagar Ecotourism zone of Corbett National Park (Uttarakhand) India.

Month	2023		2024	2025			
	With Lantana shrub		After the removal of Lantana				Vegetative area in which the largest group of Chital found
	Total number of Chital deer (N)	No. of herds	Total number of Chital	No. of herds	Total number of Chital deer (N)	No. of herds	

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			deer (N)				
January	**86**	3	**47**	4	**26**	4	In shrub area and grassland, feed on remaining grass and shrubs (Lantana and Jujube)
February	**112**	3	**86**	5	**55**	6	Under Shisham trees plantation
March	**128**	4	**92**	5	**37**	6	Under Shisham trees plantation
April	**56**	6	**43**	6	**19**	4	Found in mixed forest Kari patta and Peelu shrub (after pre-fire season)
May	**23**	5	**16**	6	_		Found in mixed forest Kari patta and Peelu shrub (after pre-fire season)
June	**15**	6	**9**	5	_		Under Sal Forest feed on Kari patta and Peelu leaves
July	**144**	3	**66**	4	_		Under Eukalyptus and Saugon trees feed on Dub grass (new babies and kids also found)
August	**156**	3	**75**	3	_		Under Eukalyptus and Saugon trees feed on Dub grass
September	**46**	4	**41**	3	_		In grassland area
October	**88**	3	**38**	3	_		In grassland area
November	**75**	4	**30**	4	_		In the shrub area feed on Jujube and Lantana leaves and grassland
December	**16**	3	**15**	3	_		In the shrub area feed on Jujube and Lantana leaves and grassland

*N= Total number of individuals in a group

Figure 1. Monthly variation in population size of Chital deer

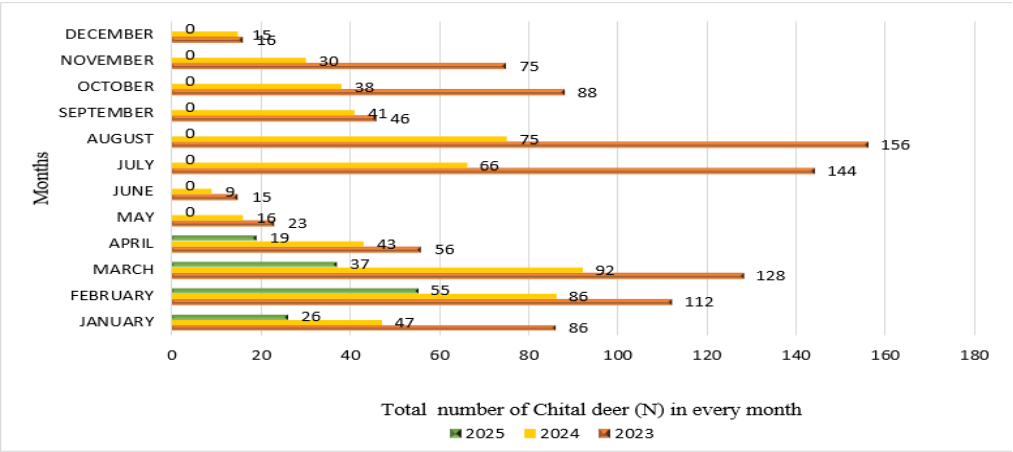

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Table 2. Feeding hours of Chital deer in Hathidagar Ecotourism zone (2023 and 2024).

Sr no.	Feeding hours of Chital group (Time in GMT+5:30)	
	In 2023	In 2024
1	04:30AM-06:00AM	04:30AM-05:30AM
2	07:30AM-09:00AM	07:00AM-08:00AM
3	12:00 PM-01:30 PM	12:00 PM-01:30 PM
4	04:30 PM-06:00 PM	05:00 PM-06:00 PM
5	_	06:00 PM-07:00 PM

Group Size Of Chital Deer

Chital groups move from one area to another depending on their food availability. The data regarding the Chital deer population in the Lantana boundary area are given in Table No. 1. In the year-round observation, herds of Chital are seen in different places in different months. The total number of members in the Chital group has been found to have decreased as compared to the first-year observations (2023). The number of Chital groups has increased in 2024 and 2025 respectively (Table 1 and Figure 1). Similarly, an increase in feeding hours has also been observed (Table 2).

The Chital group is found in grassland areas in most of the months (from July to December months). After that some Chital groups move to the shrub area and feed on Jujube plants and Lantana bushes for fruits in January, February, and March months. Chital groups were found in the Shrub area under Sal mixed forest in April, May, and June months. The large group is found in the Saugon forest and feeds on new sprouting grass after post-fire season (during monsoon months i.e. June, July, and August). Although, in July and August the grass is green and high in grassland but Chital group is also found under the large trees to eat the Dub grass and avoid the long grasses of monsoon (table 1). Chital showed seasonality in breeding and fawning (Rajawat & Chandra, 2018). More babies are seen with their mothers in the late January to March months of the study period indicating fawning season in late winter in Hathidagar forest.

Also, in July and August, more babies were seen with the group, although during these months the grass and shrub areas are dense enough that some group members may miss the counting because they are behind the bushes. The Eucalyptus jungle is quite open because there is some distance between its trees and the grass growing beneath it is of low height, in which animal group counting can be done well and no animal is left out from being counted. The largest group of Chital deer is found grazing in this area.

Feeding Hours and Frequency

Due to the boundary of lantana bushes, the Chital group feels safe from the villagers, residents, and other departmental people and in almost 2 hours the whole group completes its one-time feed. Due to the continuous feeding of about 2 hours by the Chital group, the frequency of feeding is obtained only 3-4 times throughout the day. Whereas after the removal of the Lantana boundary, the Chital group feels threatened by vehicles and humans coming on the roadside, due to which feeding gets disturbed and the group has to increase the feeding frequency to 4-5 times in a day (table 2).

About 50 gypsies (in one shift) pass through the Hathidagar jungle daily to visit in Phato ecotourism zone and about 25 gypsies (in one shift) come to the Hathidagar ecotourism zone daily due to which Chital group has shifted its feeding time different from gypsy entry time (morning entry timing 6:00 AM and evening 2:00 PM). However, sometimes differences have been observed in the feeding hours of the Chital group due to sunlight (in winter), heavy rainfall (in monsoon), high temperature (in summer), shade, and large predators.

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Figure 2. Herds of Chital deer in Hathidagar forest near the boundary of Lantana shrub (2023)

Figure 3. Lantana species (yellow and orange flowers) found in Hathidagar forest

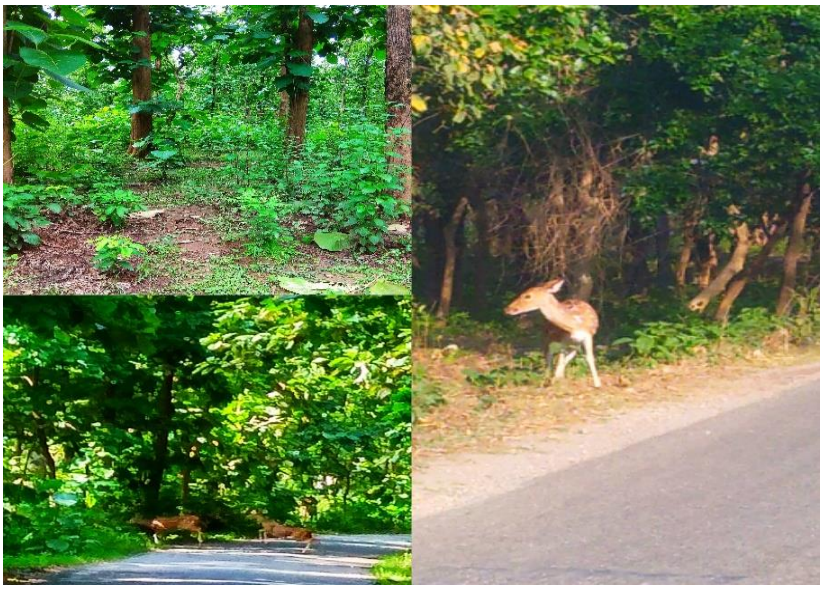

Figure 4. Chital deer near the roadside area of Hathidagar forest

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Figure 5. Different vegetative sites including entry gate, grassland area, Saugon forest and Eucalyptus plantation in the present time (2025)

CONCLUSION

The removal of Lantana bushes has affected the number of Chital groups in the Hathidagar forest. The groups of Chital are found to be of smaller size in the Hathidagar forest, after the removal of the Lantana boundary. Along with this, the feeding frequency of Chital has also increased in the roadside of Hathidagar. After the removal of the Lantana boundary, the cases of Chital running away on the road have also increased and there are chances of tigers following them coming on the road as well, due to which the danger of predation by humans and accidents has also increased. However, keeping this danger in mind, departmental work is being done to install side railings on all the turns of the road from Hathidagar to Maldhan village (main road).

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