

Habitat Assessment of Asiatic Black Bear (*Ursus thibetanus*) at Malakandi Reserved Forest District Mansehra, Khyber Pakhtunkhwa, Pakistan

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Abstract

The population of Asiatic Black bears (*Ursus thibetanus*) is declining in Pakistan. We investigated the habitat of the Asiatic Black bear in the Malakandi reserved forest having an area of 1922.7 hectares by using the line transect method. Two types of transects were taken, straight line transect and curvilinear line transect having a length of 150 meters to 250 meters having a width of 10 meters on each side of the transect. In our study, we find a total of 49 different signs, out of which 44% were scats signs. The highest percentage of signs were found near *Pinus wallichiana* trees (18.4%) followed by *Ficus carica* (16.3%) while in shrubs highest percentage was recorded (8.2%) in *Viburnum* spp. Furthermore, the GPS collected the highest number of signs between elevations from 6,000 feet to 7,200 feet (eTrex[®] 20). Our research also shows the dietary pattern of Asiatic Black bears (*Ursus thibetanus*) during the late summer season, they mostly eat fruits of *Ficus carica* as by scats analysis we found that 77 % of them contain seeds of *Ficus carica*. The analysis of scats is done by the physical comparison of undigested items found in the scats and the fruits and cones collected from the field. Our finding shows that more laboratory work on scats analysis is needed for the best habitat assessment and food preference of Asiatic Black bears in our study area.

Keywords: Asiatic Black bear, *Pinus wallichiana*, Reserved Forest, Malakandi, Habitat preference, Elevation distribution.

Introduction

Asiatic black bear (*Ursus thibetanus*) has a wide range distribution from East-Asia to South-West, which wraps Vietnam, Laos, Japan, Korea, India, China, Pakistan, Afghanistan, Iran, and a rare population in Taiwan (Ali et al., 2017). The Asiatic black bear is dispersed from westward Japan to Iran in southwestern Asia and is listed in the Red list of Vulnerable species of the IUCN (Ghadirian et al., n.d.). The moist temperate forest of Siran and Kaghan valleys of Khyber Pakhtunkhwa (KP), Neelum Valley Azad Jammu and Kashmir, and Gilgit-Baltistan province is the mostly consist habitat of the Asiatic Black Bear in Pakistan. (Zaib Ullah et al., 2020). The Asiatic black bear has a wide range of habitats, guesstimated about 50,000 plus population, but seems on declining. (Carr et al., 2001).

Asiatic black bear appearance is a black coat of smooth fur, having a V-shaped white fur on its chest below its mouth. (*Asiatic Black Bear* | WWF, n.d.). Bear has religious and cultural norms as well, most people in Asia, gall bladder and bile of Asiatic black bear in China and Japan are used for the treatment of inflammation and fever as traditional medicines. (Ali et al., 2018).

Understanding the nourishment of wildlife is the abecedarian for the reigning of their populations and habitat. Therefore chromatic methods that scientists have developed for assessing habitat wildlife have associated pros and cons. (Koike et al., 2016). Bears living in a colder environment need to store fats in the autumn season for the hibernation period. (Hashimoto et al., 2003). The Asiatic black bear (*Ursus thibetanus*) is similar to the brown bear in that it eats a variety of seasonal and regionally accessible diets that are variable in nutritional properties (Panthi & Aryal, 2019). The Asiatic black bear is an omnivore that change its diet with a change in its geographic range (Ghadirian et al., n.d.). Giant mammals are wide consumers and select their food on the foundation of seasonal availability, nutritional basis, and many presence items in their habitat (Basnett et al., 2021). Bears belong to the omnivorous mammals of the family Ursidae (Basnett et al., 2021) (Panthi & Aryal, 2019). Asiatic black bears live in diverse habitats, and belong to coniferous and broad-leaved forests, from sea-level elevation extended to 14,108ft (4300m) (Zaib Ullah et al., 2020). The Asiatic black bear is an omnivore but mostly feeds on fruits plants and leaves of some special plant species. (Hashimoto & Anrui, 2013). Because Asiatic black bears have monogastric stomachs, so they need an altitudinous-quality of diet such as fresh green vegetation and fruits. (Hashimoto & Anrui, 2013).

They prefer dense forests and shrubby lands, enwrapping various habitats which inhibit meadows, planes, burn areas, and wetlands. (Z. Ullah et al., 2021). Recent studies intimate that Asiatic black bears consume mostly green vegetation, such as freshly emerged grasses and leaves. (Furusaka et al., 2017) In Japan, the Asiatic black bear (*Ursus thebatanus*) eat varieties of food, achingly in summer (June-august), such as berries, leaves, herbs, and social insects such as bees and ants. In the spring season their diet is mostly corns and seeds of *Quercus* and *Fagus*.(Hashimoto & Anrui, 2013). Kioke (2011) intimated that the food of Asiatic black bear can be categorized as incidental or staple for each season, and bear select food items on the basis of abundance, nutritional quality, and predictability. Fruits are most abundant and nutritious, but availability must matter, achingly in summer season and as food production varies annually summer season fruits are not predictable.(Hashimoto & Anrui, 2013) Precedent study has shown that in autumn season nourishment of Asiatic black bear (*Ursus thebatanus*) which is mostly located in Southern and Northern Asia, are nuts of Fagaceae family (salix species).(Hashimoto et al., 2003) . The Asiatic black bear modified its habitat seasonally for food ambitions, the seasonal migration of Asiatic black bears depends upon on, denning position, diet availability, reproductive foraging, and breeding. (Z. Ullah et al., 2021).

The Asiatic black bear *Ursus thibetanus* has most freshly assessed for The IUCN Red List of Threatened Species in 2016. According to the criteria of A2cd of The IUCN *Ursus thibetanus* is declared Vulnerable.

The objectives of the study was to evaluate the habitat of the Asiatic black bear in regarding that near which species most of the signs were observed and what are their most preferable elevational habitat of Asiatic Black bear (*Ursus thibetanus*)

Study Area Description

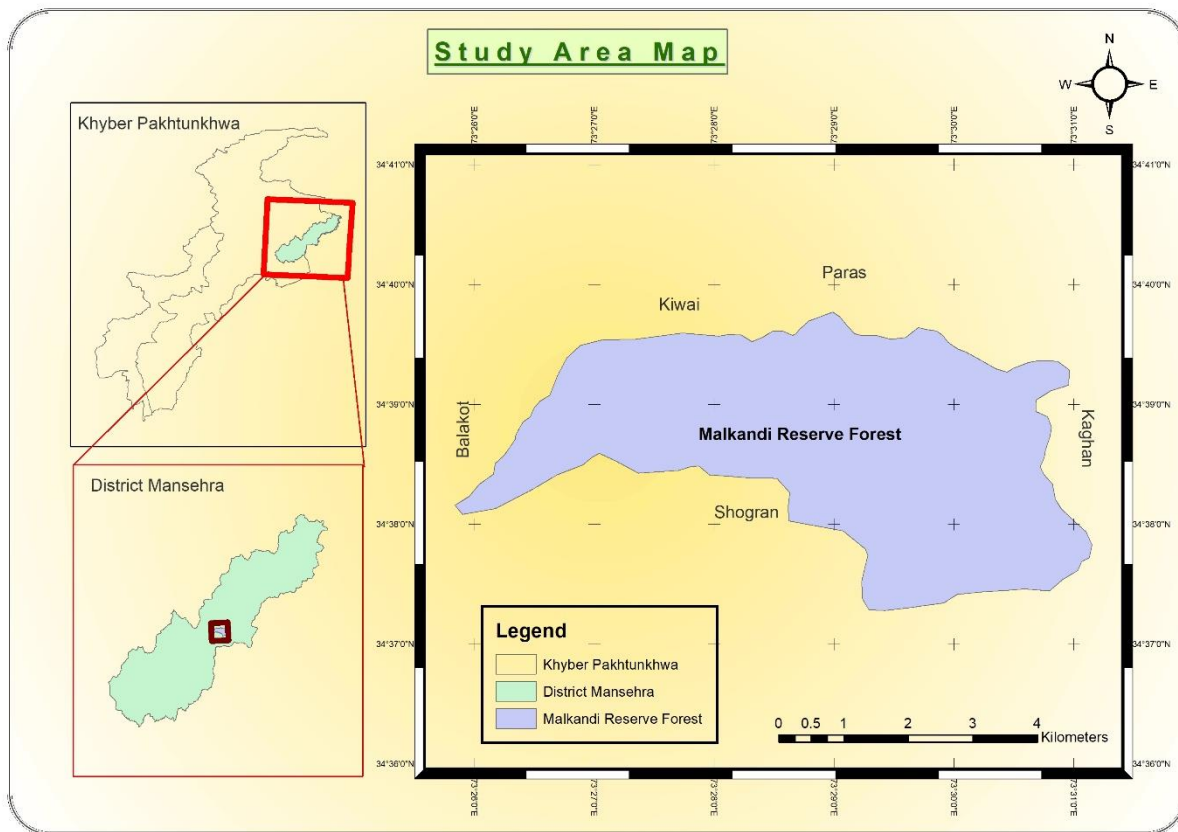


Figure 1 Map of the Study area in Malakandi Reserved Forest

Malakandi Reserved Forest fall in District Mansehra of Kaghan Valley in Balakot Range having an area of 1922.7 hectares (Revised Approve working plan from 1985-86 to 2004-2005). This areas falls in the Himalayan Moist Temperate Forest type(Waseem et al., 2017). Coniferous trees consist Deodar (*Cedrus deodara*), Blue pine (*Pinus wallichiana*), Spruce (*Picea smithiana*) and Fir (*Abies pindrow*). While in broad leaved species contained Walnut (*Juglans regia*), *Prunus padus*, *Aser cisium*, Ban kor (*Aesculus indica*) and *Poplar ciliate*. While in shrubs and herbs Indigofere spp, *Vibernum* spp, *Lonicera* spp, *Berberis lyseum* and *Rosa indica* spp are commonly found (last Revised Approve working plan from 1985-86 to 2004-2005). And also some species of *Ficus carica* were found in Malakandi reserved forest.

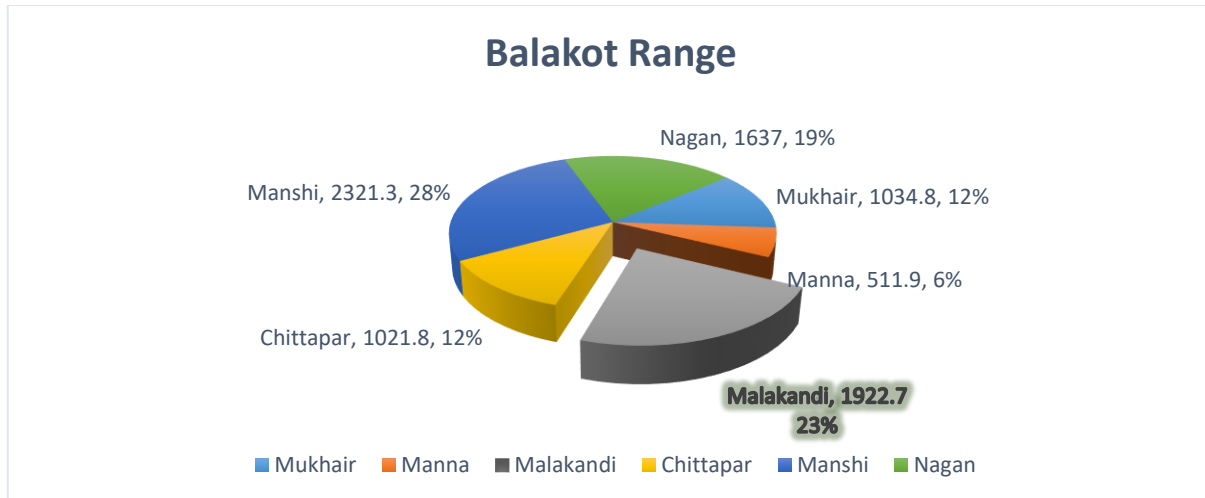


Figure 2 Percentage wise distribution of the study area in which Malakandi covered 1922.7 hec of forest area.

Methodology

Sign survey

We first conduct a preliminary survey for the confirmation of Asiatic black bear in our study area. Trails and transects were marked and checked for indications/signs and sightings. Transects were either on walking trails or transects were laid out on non-path areas to cover the whole forest/area. The transect line method involve moving on a straight line and counting sign's on both sides of the transect. It is a widely used technique in the relative density of the population or the habitat assessment of the wildlife (Harvey & Harvey, 1972; Marques et al., 2001; Sathyakumar et al., 2013). In some places the straight line transects were not possible in Hindukush range due to undulated topography therefore trail/curvilinear transects samplings have been used in Hindukush terrain (Ramesh, 2003).

In the line transect method, we take six transect lines. These transects were taken in such places where the density of signs was high. All these transect lines were taken randomly in which the length of the transect varies from 150 meters to 250 meters having a width of 10 meters on each side of the transect, in which the first two transects have a length of 150 meters while the rest of them have 250 meters, the distance of transect lines were measured by a measuring tape by two of our colleagues while one person was entering the data in a sign survey sheet/questioner and other's was

searching the signs and collected the data about the signs, coordinates and elevation of the sign are recorded with the help of GPS (eTrex® 20).

There are different sorts of signs of black bear which often include tracks, scats, diggings of soil to excavate insects, stone turns, bedding sites, bark stripping, rake marks on trees, pug marks, plants uprooting, place of livestock killings, hair samples, crop damages, bees nest damaging etc. GPS (eTrex® 20) was used for the recording of each sign. (Sathyakumar et al., 2013; Z. Ullah et al., 2021)

Different Transects

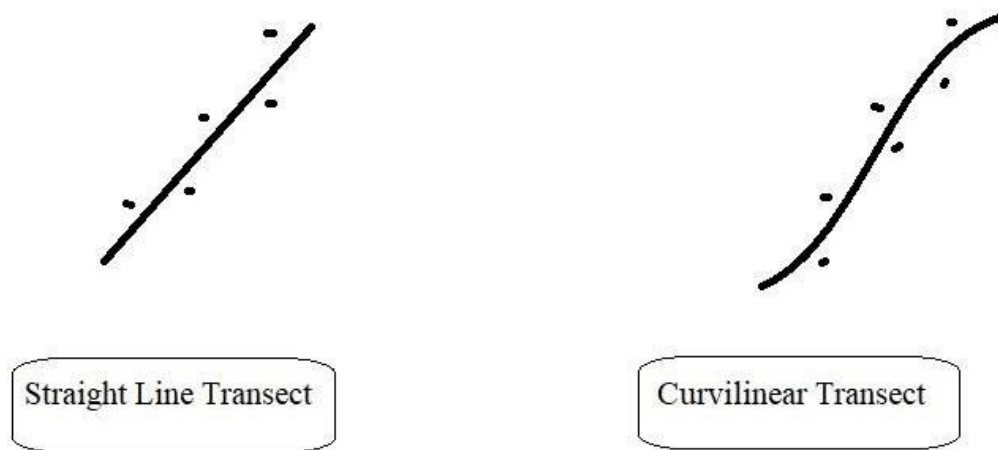


Figure 3 Types of Line Transects Used in the Study area

Results

At the result of sign survey method, nine different types of signs were observed such as scats, pug-marks, stone uplifting, plants uprooting, claw marks, bark off, dig marks, hair samples, scratches on trees. Out of which 44 % scats signs were observed. The coordinates and elevation of each sign was recorded by GPS (eTrex® 20).

Each sign was observed at different transect lines, these signs represent the habitat of Asiatic black bear. Therein total 49 signs were observed, in which 44 % of scats sign were found. During the scats collection, we also collected the fruits species and their seeds for the identification of fruit items in scats which is described by (Mealey, 1980). And by physical comparison we identified that 77 % scats contain *Ficus carica* fruit seeds. The images of Scats were confirmed by that it belong to Asiatic black

bear by mailing these images to (*Scat / Droppings - North American Bear Center*North American Bear Center, n.d.).



Figure 4 Scats of Asiatic Black Bear

Table 1 Frequency and Percentage of different Vegetation where habitat was observed

Habitat observed				
	Frequency	Percent	Valid Percent	Cumulative Percent
<i>Abies Pindrow</i>	2	4.1	4.1	4.1
<i>Acer caesium</i>	2	4.1	4.1	8.2
<i>Ailanthus altissima</i>	2	4.1	4.1	12.2
<i>Aristida</i>	2	4.1	4.1	16.3
<i>Berberis</i>	2	4.1	4.1	20.4
<i>Cedrus deodara</i>	2	4.1	4.1	24.5
<i>Ferns</i>	1	2.0	2.0	26.5
<i>Ficus carica</i>	8	16.3	16.3	42.9
<i>Juglan regia</i>	1	2.0	2.0	44.9
<i>Parrotiopsis jacquemontiana</i>	1	2.0	2.0	46.9
<i>Picea smithiana</i>	5	10.2	10.2	57.1
<i>Pinus roxburghii</i>	1	2.0	2.0	59.2
<i>Pinus wallichiana</i>	9	18.4	18.4	77.6
<i>Quercus</i>	3	6.1	6.1	83.7
<i>Rosa indica</i>	1	2.0	2.0	85.7
<i>Rubus</i>	1	2.0	2.0	87.8
<i>Taxus baccata</i>	1	2.0	2.0	89.8
<i>Viburnum</i>	4	8.2	8.2	98.0
<i>Viola</i>	1	2.0	2.0	100.0
Total	49	100.0	100.0	

Habitat Assessment

Habitat assessment was carried out within each transect and all the necessary information about the vegetation and their elevation were collected. The vegetation of the study area was assist that which specie have a highest frequency rate and the best suitable elevation which were observed during our studied.

Vegetation

The habitat of Asiatic Black bear were recorded in 19 different species in which the highest percentage is *Pinus wallichiana* (18.37%) then followed by *Ficus carica* (16.33%), *Picea smithiana*

(10.20%), *Viburnum* spp (8.16%), *Quercus* (6.12 %) while in *Abies pindrow*, *Ailanthus altissima*, *Berberis*, *Aristida*, *Acer caesium* (4.08%) is observed. And the least percentage is found in *Viola*, *Rosa indica*, *Taxus baccata*, *Pinus roxburghii*, *Rubus*, *Parrotiopsis jacquemontiana*, *Juglans regia*, Ferns about 2.04%. (Table 1)

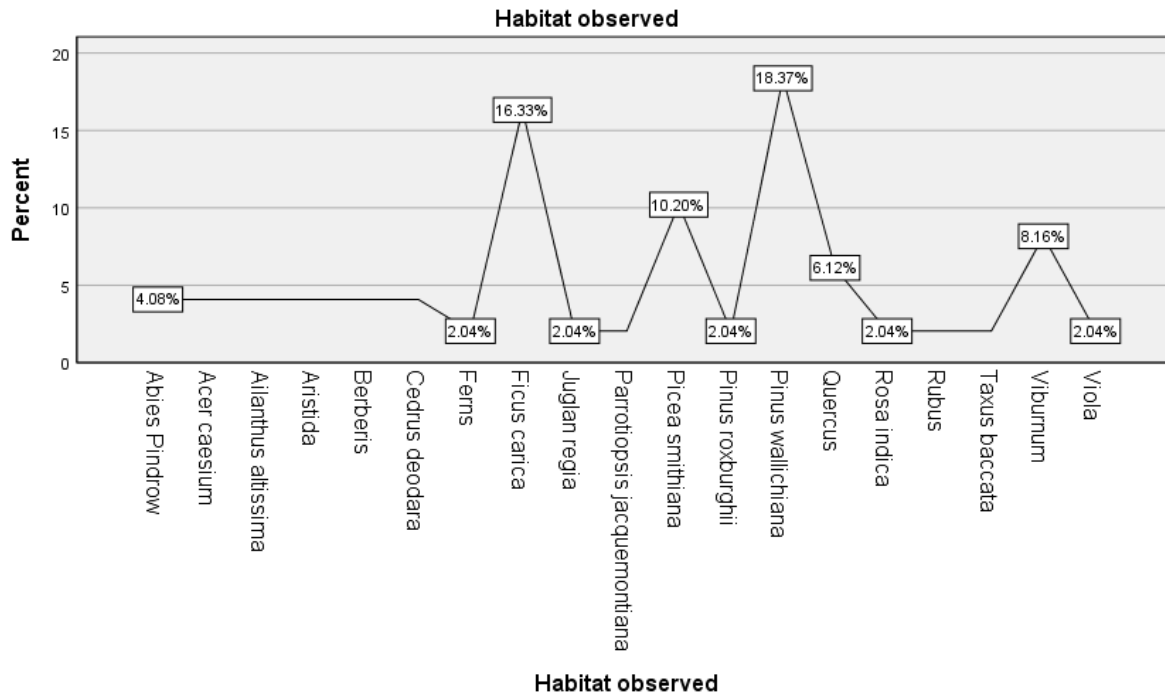


Figure 5 Habitat Observed on Different Vegetations

Elevation:

We found the highest and lowest altitude of signs at 8380ft and 4712ft. whereas most of the signs were observed within a range of 6000ft to 7200ft of elevation from sea level. But Asiatic Black bear change their habitat or place of occurrence or living according to the availability of food. (Figure 6).

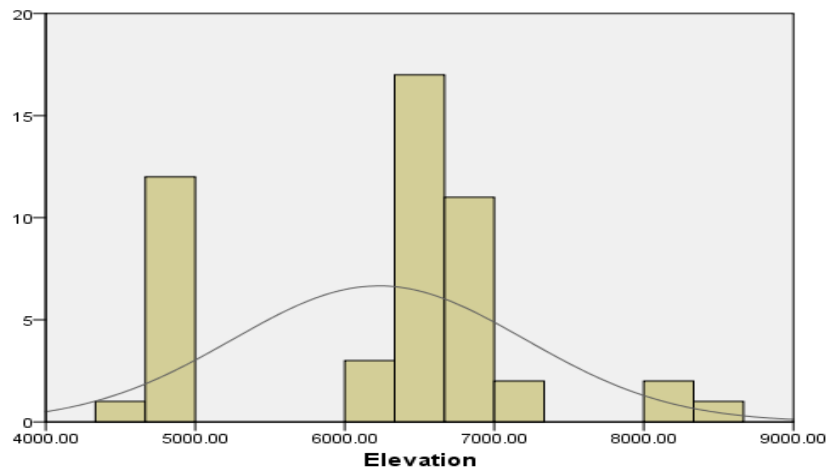


Figure 6 Elevation of sign's

Dietary pattern

Large mammals change their dietary pattern according to their seasonal variation and the availability of food, if fruits are available, they prefer fruits, if not then they rely on insects, crops etc. According to (Basnett et al., 2021) scat analysis is one of the most commonly used and popular ways of analysing mammalian feeding behaviour, and it is a particularly successful approach for understanding the seasonal dietary spectrum of hidden carnivorous and omnivorous animals.

During the scats collection, we also collect the fruit species and their seeds for the identification of fruit items in scats which is described by (Mealey, 1980). In this method we mix the scats with water and put remain in it for one hour when the scats were mixed with water, we pass that water from a semi-permeable membrane. With the help of this, all of the water was removed and only the un-digested food eaten by Asiatic Black bears were remain

there. As we also collected the seeds of fruits, cones and fruits etc from the field by physical comparison we identified that 77 % of scats contain *Ficus carica* fruit seeds.

The images of Scats were confirmed that they belong to Asiatic black bear by mailing these images to (*Scat / Droppings - North American Bear Center North American Bear Center, n.d.*)

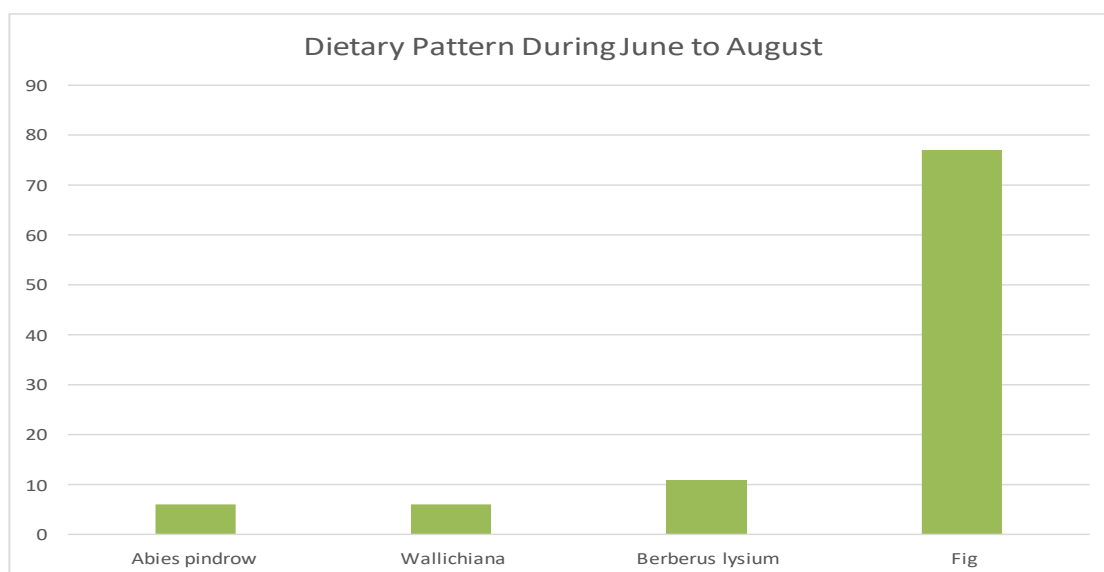


Figure 7 Dietary Pattern of Asiatic Black Bear During June to August (late summer) in the study area

Discussion

The data collected during our studied, it confirmed the presence of Asiatic black bear in Malakandi reserved forest as likely previously reported by (Ali et al., 2018; Z. Ullah et al., 2021; Waseem et al., 2017). Our study provided new information regarding the habitat of Asiatic black bear in which most of the signs observed are near *Pinus wallichiana* (18.37%) and *Ficus carica* (16.33 %) species whereas habitat were also observed in *Viburnum* (8.16%), *Quercus* (6.12%) as well as in *Picea smithiana* (10.20%). Similary (Z. Ullah et al., 2021) also recorded for habitat assessment in Kaghan and Siran valley that *Pinus wallichiana* (34.22%), *Picea smithiana* (27.33%), *Abies pindrow* (13.54%), *Quercus* (3.95%) while in shrubs the most abundant is *Viburnum* (60.29%). *Viburnum* spp (50%) is also reported by (Ali et al.,

2017). There is a large variance between our investigated proportion of *Pinus wallichiana* (18.37%) and *Pinus wallichiana* (34.22%) of (Z. Ullah et al., 2021). As a result, they calculate their percentages individually for trees, shrubs, and herbs. In our research, we determined a combined percentage by treating trees, shrubs, and herbs as a single vegetation. So that's why our percentage of species are low.

Whereas in scats we found signs of cones of *Pinus wallichiana*, berries seeds and *Ficus carica* fruit seeds, out of which (77 %) scats samples contain fruits seeds of *Ficus carica*.

Our study also provided new information about the altitudinal distribution of habitat of Asiatic black bear in Malakandi reserved forest, in which the majority of signs were found between 6000 feet to 8300 ft. Similarly, (Ahmad et al., 2022) also reported high occurrence of signs in Hindu Kush mountains of Pakistan at between 5200 feet to 11000 feet. Furthermore, (Bista & Aryal, 2013) claimed that the majority of the signs were discovered in Nepal at elevations ranging from 7500 to 8800 feet. According to (Ali et al., 2017) 70% of the bear evidences were discovered at an altitude of 6500-7500s meters above sea level in a forest containing *Abies pindrow*, *Picea smithiana*, *Cedrus deodara*, *Pinus wallichiana*, *Quercus* spp., and *Juglans regia*.

Conclusion

Our results confirmed the presence of Asiatic black bear in Malakandi reserved forest. And provided data about the habitat of Asiatic black bear. Our study also concluded the seeds of *Ficus carica* fruits in their scats which would be very helpful for the management and conservation of Asiatic black bear in Malakandi reserved forest. As this species is already extinct in the Ayubia National Park and Chitral Gol National Park (Ahmad et al., 2022). Furthermore laboratory analysis of scats of Asiatic Black bear is needed to know the dietary pattern.

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