

Seasonal variation on food and feeding habit of *Macaca mulatta* (Zimmermann, 1780) at Yedaguntaung (Hill), Mandalay Region

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Abstract

In Myanmar urban rhesus monkey (*Macaca mulatta*) is found in forest-habitats and urban areas. In the present study learned on food and feeding habit of this Macaque species during Hot, Raining and Cold Season in Yedaguntaung (Hill), Mandalay Region by applying direct counting method in field survey. The surveys were done on the day i.e morning phase (6:00 AM – 11:00AM), afternoon phase (11:00AM -3:00PM) and evening phase (3:00PM- 6:00PM). Macaque fed on a total of 41 plants species were countered under family Moraceae and Fabaceae (10%) comprises. Among the natural food of rhesus monkey in study area, the most preferred food items were leaves, fruits, flowers and bark of *Delonix regia* (Sein ban). The leaves, fruits and flowers of *Tamarindus indica* (Magyi), *Mangifera indica* (Thayet) and *Dalbergia glomeriflora* (Thit pagan) were the second preference. The highest number of natural foods used by rhesus macaques was leaves (69.08%), fruits (16.00%). The least number used by macaques was flowers (13.25%) and bark (1.21%). Maximum numbers of natural foods feeding were observed in January and February 2020. Minimum number of feedings observed in April 2019. The monkeys primarily ate on young leaves, mature leaves, fruits, flowers, flower buds and seeds during study. This study showed that Macaque adopted different foraging strategies based on the availability of resources in their habitat.

Key words: Feeding habit, Urban Rhesus Monkey (*Macaca mulatta*), Fauna and Flora, Yedaguntaung (Hill)

Introduction

The Republic of the Union of Myanmar is situated in the north west of the Indochina peninsula, and is the largest country in mainland South East Asia, having a forest cover of over 27 million, representing slightly over 41% of the total land area. So, Myanmar has a rich diversity of fauna, 360 species of reptiles and amphibians and about 68 swallow tail butterflies (Thein Lwin, 1995 cited by Wah Wah, 2017). Singh *et al.*, 2013 stated that primates of their physical resemblance to humans have always fascinated people. The interest of scientists in primates primarily began in the field of physical anthropology and evolutionary biology tracing human evolution from primate fossils. A systematic study of primate behavior started in 1940. Primates are largely distributed in the tropics.

Rhesus monkeys are food generalists and mostly feed on the ground. The natural diet of *M. mulatta* is primarily vegetarian and includes fruits, seeds, flowers, leaves, buds, shoots, twig stems, roots, barks, pith and resin of hundreds of species of angiosperms, gymnosperms, and fungi (Fooden, 2000 cited by Majumder *et al.*, 2012).

Kumar and Solanki, 2003 studied the food preference of the rhesus macaque varies according to the habitat and seasonal availability food. A preferred varies according to the habitat and seasonal availability food. A preferred food species is defined as one that is utilized proportionally more frequently compared to its availability and high intensity of feeding on the species. Primate can adopt different foraging strategies in response to seasonal changes in food availability (Hemingway and Bynum, 2005; Tsuji *et al.*, 2013). Rhesus macaque (*Macaca mulatta*) has the broadest geographic distribution of any primate and inhabits a diverse range of tropical and temperate forests (Fooden, 2000).

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Their diet varies strongly depending on environmental conditions; rhesus macaques in temperate forests of northwestern Pakistan are mostly folivorous (Goldstein and Richard, 1989), whereas those living in tropical forests in northern India are frugivorous (Lindburg, 1976 cited by Tang *et al.*, 2015).

In South America, the typical primate fruit is large, yellow brown, or green with a woody exterior (Janson, 1983) whereas in Africa primates feed on medium-sized, dehiscent, bright red, yellow, or orange fruit with arillate seeds or drupes (Gautier-Hion *et al.*, 1985). Sarker *et al.*, 2008 reported that there are a variety of foods in the evergreen and semi-evergreen forests and also in rural areas of South and Southeast Asia. Trees are the main source from which the macaques and other primates collect all plant parts (e.g fruits, leaves, flowers, bark, etc), vines on epiphytes that live in it and in turn supports several invertebrates and vertebrates' animals. In Bangladesh, rhesus macaques also live in some urban areas of the country and they also depend on the cooked and left over food of human beings along with natural foods of those areas.

Ohdachi *et al.*, 2010 described that the rhesus macaque is adapted to various habitats including subtropical and temperate forests, semi-desert and snowed areas. It can be observed from the seashore to elevations of 2,500 m in its original range. Typically, rhesus macaques are rare in broad-leaved evergreen forests but often observed in secondary, deciduous, coniferous and mangrove forests. The lifespan is usually 20-25 years in the wild. They also live in cities and towns in the northern Indian State of Uttar Pradesh. In Calcutta, the groups live in houses and buildings.

A good diet is important for the survival of a species, which provides essential nutrients. All primates have the same general need to acquire energy, amino acids, minerals, vitamins, water and certain fatty acids, but their specific individual requirements vary and are met in a variety of ways. No one species behavior identical to another and even within a species there is usually variation in diet between individuals, social groups and populations (Oates, 1987). The feeding behavior of many species also changes seasonally in response to short-term fluctuations in the availability of preferred food items and /or resources (Terborgh, 1983 cited by Sarker *et al.*, 2008).

Yedaguntaung (Hill) area is situated in Patheingyi Township, Mandalay Region. The hill is a natural lime-stone, steep and also found with forested area. Temples and pagodas constructed on the hill, is also one of the habitats of rhesus monkey. The present study was focusing on food and feeding habits of Rhesus monkey in Yedaguntaung.

The main objectives of the present study are;

- to examine of plant species in the study area
- to assess food and feeding habits of the rhesus monkey at the study area

Materials and Methods

Study area

The present study was conducted seasonally at the Yedaguntaung (Hill), Patheingyi Township, Mandalay region. It is situated in the Central Dry Zone at 21° 57' 58" - 21° 58' 00" N and 96° 12' 46"- 96° 13' 00" E (Fig 1). The highest peak of Yedaguntaung (Hill) has an elevation of 248 m above the sea level and the base of hill has 128 m. The study area is evergreen lowland forests types.

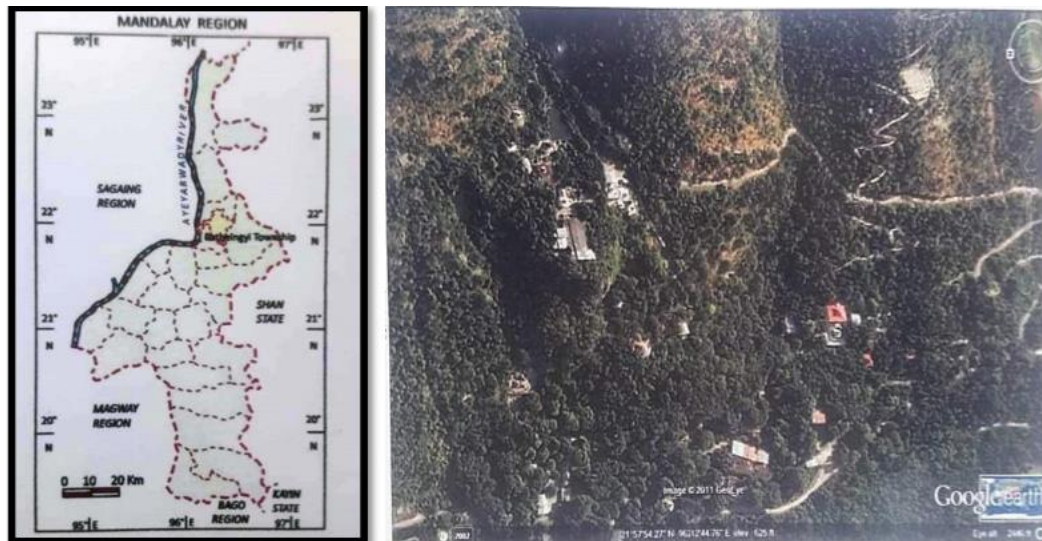


Fig. 1. Location of map study sites around Yedaguntaung (Hill) (Source from Google Earth)

Study period

The study period was from March, 2019 to February, 2020.

Identification of species

Plant species were identified and verify by Botany Department, Mandalay University, Tin Tin Khaing (2012) and based on Kress *et al.*, 2003 and the present primate species was identified by Francis C. M., 2003 and the field guide of Primates of Myanmar.

Collection of Data

The food and feeding habits of Rhesus macaques was estimated by using direct count method (Chopra and Kumar 2012). The study area has a stairway, which is 400 m long and facilitated location of groups. The study site was followed and monitored in three phases of the day i.e morning phase (7:00 AM – 10:00AM), afternoon phase (11:00AM -2:00PM) and evening phase (3:00PM- 5:00PM). At that time local people were interviewed regarding their religion, culture and attitude toward the monkeys. The feeding sites of rhesus monkey were marked and subsequently scanned to identify the feeding objects (plant parts i.e bark, gum, leaves, inflorescences etc, or animals, if any). A list of the all-plant species (leaves, shoots, fruits, flower) were recorded as followed after Islam and Feeroz., 1992, Ahsan, 1994, Cited by Muzaffar *et al.*, 2007). All plant species marked and collected specimens for later identification.

Results

Composition of plant species in the study sites

A total of 41 plant species are recorded under 24 families, comprising 30 species of tree, six species of small tree, one species of shrub, two species of climber, one species of grass and one species of bamboo (Table 1). The most of the plants occur naturally, though a few were planted. Rhesus macaques inhabit in Yedaguntaung area are omnivorous, feed on natural food as well as provisional food. Natural food items include leaves, fruits, flowers and bark. More than one part of some plant species was eaten. Plant species of *Ficus religiosa* (Bawdi- nyaung), *Ficus hispida*

(Kadat), *Artocarpus heterophyllus* (Peinne), *Ficus glomerata* (Thaphan) family Moraceae and *Senna siamea* (Mezali), *Butea monosperma* (Pauk), *Pterocarpus indicus* (Padauk), *Dalbergia glomeriflora* (Thit pagan) family Fabaceae are abundance in the study area environs throughout the study period.

Food diets available for rhesus macaque *Macaca mulatta* in the study area

The food consumed by the relocated Rhesus Macaques into categories based on variations in resource availability:

Natural plant species: The natural plant, trees, herbs and shrubs available in the sanctuary.

Supplementary foods: Food given by the forest department daily in this sanctuary for feeding the rhesus macaques only (seasonal vegetables and fruits; 2500 kg/day).

Provisioned food: Banana and roadside food (bread and chick-pea) thrown by the public to the macaques daily; the macaques often travel to the boundary walls, cross is, and sit on the highway it to have these items.

Anthropogenic food: Garbage and human food resources (Indian bread, oily fries, and potato chips) snatched by the macaques daily from human settlements situated within 0.5 km of the protected area.

Water: Water from channels made in the sanctuary exclusively for rhesus macaques

Natural food plant species for rhesus macaque *Macaca mulatta* in the study area

During the study period, the rhesus macaque *Macaca mulatta* were found to eat on 28 plant species as their food such as 25 species of leaves, 14 species of fruits, 8 species of flower and 2 species of barks. In the hot season, the diet composition on leaf (73%), fruit (26%), flower (14%) and bark (4%) whereas in rainy season, the leaf composition (70%), fruit (14%), flower (14%) and bark (2%) and in the cold season, the leaf composition (73%), fruit (13%), flower (14%) and bark (0%). Among them, the most of plant species were belonging to family Moraceae and Fabaceae with 10% for each (Fig. 2). Among them, the food parts in species *Delonix regia* (Sein ban) under the family of Coelapiniaceae were found as the most preference plant species. As the monthly variation, January and February was found to be the month with the highest total number of plants species eaten by monkey (24 plant species) and the lower number of plant species were consumed in April (nine plant species) (Table 2). As seasonal variation, the leaves were composed of as the highest proportion (69.08%), fruits (16.00%), flowers (13.25%) and bark (1.21%) (Fig.2).

Provisioned foods

The rhesus macaques are dependent on various kind of provisioned food. The provisioned foods were given by pilgrims and villager. Provisioned food includes banana, guava, coconut, peanut, chick-pea, maize, mango, biscuits, bread, wafer, cucumber, carrots, juices and sunflower seed. During the study period provisioned foods were the most abundance in the study area. The least frequency of provisioned foods was biscuits and wafer. The highest frequencies of provisioned foods were banana and maize.

Table 1. Record of vegetative species in Yedaguntaung

No.	Tree species	Local name	Family
1.	<i>Azadirachtaindica</i>	Tama	Meliaceae
2.	<i>Chukrasia tabularis</i>	Yin ma	Meliaceae
3.	<i>Delonix regia</i>	Sein ban	Coelapiniaceae
4.	<i>Tamar indusindica</i>	Magyi	Coelapiniaceae
5.	<i>Ficusrel igiosa</i>	Bawdi-nyaung	Moraceae
6.	<i>Ficus hispida</i>	Kadat	Moraceae
7.	<i>Artocarpus heterophyllus</i>	Peinne	Moraceae
8.	<i>Ficus glomerata</i>	Thaphan	Moraceae
9.	<i>Mangifera indica</i>	Thayet	Anacardiaceae
10.	<i>Cocos nucifera</i>	Ohn	Arecaceae
11.	<i>Mimusops elengi</i>	Khayay	Sapotaceae
12.	<i>Senna siamea</i>	Mezali	Fabaceae
13.	<i>Butea monosperma</i>	Pauk	Fabaceae
14.	<i>Pterocarpus indicus</i>	Padauk	Fabaceae
15.	<i>Dalbergia glomeriflora</i>	Thit pagan	Fabaceae
16.	<i>Limonia acidissima</i>	Thi	Rutaceae
17.	<i>Aegle marmelos</i>	Okshit	Rutaceae
18.	<i>Leucaena leucocephala</i>	Aweyar/Bawzagaing	Mimosaceae
19.	<i>Acacia catechu</i>	Sha	Mimosaceae
20.	<i>Zizyphus jujube</i>	Zi	Rhamnaceae
21.	<i>Terminalia oliveri</i>	Than	Combretaceae
22.	<i>Terminalia catappa</i>	Banda	Combretaceae
23.	<i>Tectona hamiltoniana</i>	Dahat	Verbenaceae
24.	<i>Tectona grandis</i>	Kyun	Verbenaceae
25.	<i>Sterculia versicolor</i>	Shaw phyu	Sterculiaceae
26.	<i>Phyllanthus pomiferus</i>	Zibyu	Euphorbiaceae
27.	<i>Crotoobl ongifolius</i>	Thetyingyi	Euphorbiaceae
28.	<i>Diospyros embryopteris</i>	Te	Ebenaceae
29.	<i>Schrebera swietenoides</i>	Taw-gwe	Oleaceae
30.	<i>Cordia dichotoma</i>	Thanut	Boraginaceae
Small Tree			
1.	<i>Balanites aegyptiaca</i>	Thitpalwe	Balanitaceae
2.	<i>Hesperethusa crenulata</i>	Thanakha	Rutaceae
3.	<i>Bauhinia accuminata</i>	Swe-daw	Caesalpiniaceae
4.	<i>Annonas quamosal</i>	Awzar	Annonaceae
5.	<i>Arenga nana</i>	Yone	Arecaceae
6.	<i>Jatropha curcas</i>	Kyet-su-gyi	Euphorbiaceae
Shrub			
1.	<i>Boscia variabilis</i>	Thamon	Capparaceae
Climber			
1.	<i>Cissampelo spareira</i>	Rat-nabaung	Menispermaceae
2.	<i>Wattakakayolubilis</i>	Gwedawk	Ascleniadaceae
Grass			
1.	<i>Cyno dondactylon</i>	Mye-sarmyet	Rhamnaceae
Bamboo			
1.	<i>Dendrocalamus strictus</i>	Bamboo	Poaceae

Table 2. Monthly different species of plants consumed by rhesus monkey *Macaca mulatta* in Yedaguntaung

Family	No	Scientific name	Local name	Hot			Rainny				Cold				
				Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Meliaceae (2%)	1.	<i>Azadirachtaindica</i>	Tama	L, F	-	L	L	L	L	L	L	L	L	L, FL	L, FL
	2.	<i>Chukrasia tabularis</i>	Yin ma	B	-	-	B, L	-	-	-	-	-	-	L	L, FL
Coealpinaceae (5%)	3.	<i>Delonix regia</i>	Sein ban	L, F	-	B	L,F,F	L,	L,F,FL	L,F;FL	L	L	L	L	L
	4.	<i>Tamar indusindica</i>	Magyi	L, F	-	-	L, Fl	-	L	L	L	L	L	L, FL	L, FL
Moraceae (10%)	5.	<i>Ficus religiosa</i>	Bawdi-	-	F	-	L	L	L	L,F,FL	L, F	L, F	L, F	L, FL	L, FL, F
	6.	<i>Artocarpus</i>	Peinne	L	L	-	-	-	-	-	-	-	-	L	L
	7.	<i>Ficus glomerata</i>	Thaphan	F	-	L	-	F	-	L	L	L, F	L, F	L, F,	L, FL, F
Anacardiaceae (2%)	8.	<i>Man giferaindica</i>	Thayet	Fl, F	-	-	L	L	-	L	L	L	L, F	L, FL	L, FL, F
Arecaceae (5%)	9.	<i>Cocosnuc ifera</i>	Ohn	F	-	-	-	-	F	-	-	-	-	-	-
	10	<i>Arenga nana</i>	Yone	L	Fl	-	-	-	L	-	-	-	-	-	-
Sapotaceae (2%)	11.	<i>Mimusops elengi</i>	Khayay	Fl	-	-	L	L	L	-	-	-	-	-	-
Fabaceae (10%)	12.	<i>Pterocarpus sindicus</i>	Padauk	L	-	-	-	Fl	-	L	L	L	-	-	-
	13.	<i>Dalbergiaglo</i>	Thit pagan	L	L, Fl	L, F	-	F	-	LF,FL	L	L	L	L	L
Rutaceae (7%)	14.	<i>Aegle marmelos</i>	Okshit	L, F	-	L	-	-	L	L	L	L	L	L	L
	15.	<i>Hesperethusa</i>	Thanakha	-	L	-	L	L	-	-	-	-	L, F	L, F	L, F
Mimosaceae (5%)	16.	<i>Leucaena</i>	Aweyar	L, F	-	-	-	-	-	L	L	L	L, FL	L, FL	L, FL
Rhamnaceae (5%)	17.	<i>Zizyphus jujube</i>	Zi	F	-	-	-	-	-	-	L, F, FL	L, F, FL	L, F	FL, L,	L, F
	18.	<i>Cynodon dactylon</i>	Mye-sarmyet	L	L	-	-	L	-	-	-	-	-	L	L
Combretaceae (5%)	19.	<i>Terminalia oliveri</i>	Than	-	-	L,	L, Fl	-	L	L	L	L	L	L	L
	20.	<i>Terminalia catappa</i>	Banda	F	-	-	-	-	-	L	L	L	L	L, FL	L, FL
Verbenaceae (5%)	21.	<i>Tectona</i>	Dahat	L	L	L	L, Fl	-	Fl	-	-	L	L	L	L
Euphorbiaceae (7%)	22.	<i>Crotooblongifolius</i>	Thetyingyi	L	-	-	-	-	-	-	-	-	-	L	L
Oleaceae (2%)	23.	<i>Schrebera</i>	Taw-gwe	F	L	-	L	L	-	-	L	L	L	L	L
Balanitaceae (2%)	24.	<i>Balanites aegyptiaca</i>	Thitpalwe	L	-	L	-	-	-	-	-	-	-	L	L
Annonaceae (2%)	25.	<i>Annona squamosal</i>	Awzar	-	-	-	-	L	-	L	L	L	L	L	L
Menispermaceae (2%)	26.	<i>Cissampelospareira</i>	Rat-nabaung	-	L	-	L	-	-	-	-	-	-	L	L
Poaceae (2%)	27.	<i>Dendrocalamus</i>	Bamboo	L	-	L	-	L	-	L	L	L	L	L	L
Capparaceae (2%)	28.	<i>Boscia variabilis</i>	Thamon	-	-	L	-	-	-	L	L	L	L	L	L
			Total	22	9	10	12	13	10	15	17	18	18	24	24

L = Leaves,

F = Fruits,

Fl = Flowers,

B = Bark

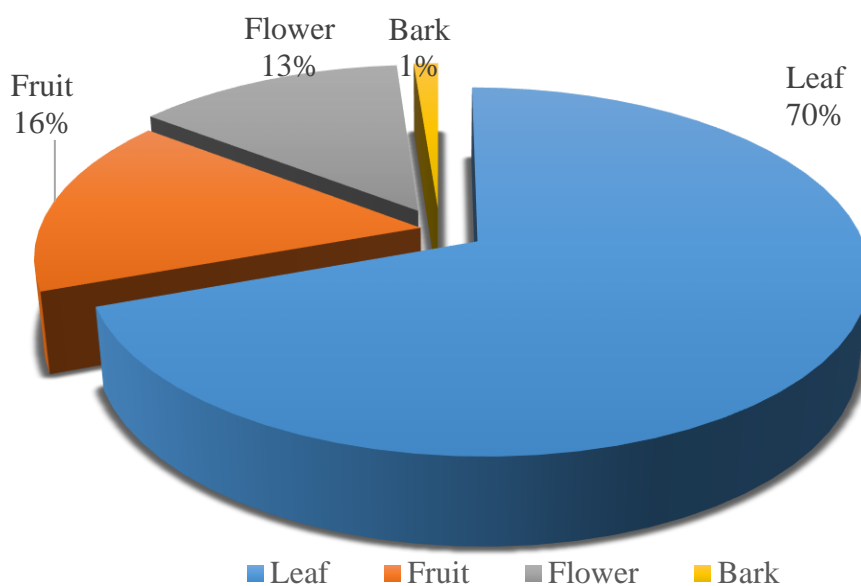


Fig 2. Percentage of plant parts eaten by rhesus monkeys in the study sites

Discussion

Rhesus monkeys were found in elevation of 248m asl in evergreen lowland forest in the study area where was a variety of plant species and as well cultivated plants. It is suitable habitat for rhesus monkey and provisioned foods are also abundance. Especially, they were found in forested area and near human settlements. Nwe Nwe Win (2013) who stated that these species thrive in a variety of climates and natural environments and they are ecologically adaptable to a variety of habitat, including dry forest, deciduous forest and evergreen forest. Wenyuan *et al.*, (1993) also stated that rhesus monkeys are found in elevation between 240 and 1962 m asl (above sea level) in the deciduous forest. Aye Mi San (2007) also reported that long-tailed macaques inhabited at elevation of 122 m asl in evergreen lowland forest. They are socially interesting and exhibit a high sense of intelligence, which makes them one of the closest animals to man (Myo Myo Aung, 2014).

In the present study area, totally 41 plant species recorded under 24 families, comprising 30 species of tree, six species of small tree, one species of shrub, two species of climber, one species of grass and one species of bamboo were recorded as the vegetative information.

Regarding to the feeding habit, Aye Mi San (2007) stated that the long-tailed macaques at Bayin Nyi Naung Mountain are folivores and among 23 plant species, five species of tree plants are the most important for rhesus macaques especially *Ficus glomerata* (Thapan). Naw Phaw Phaw Say (2005) also reported that favorite fruits of macaques are *Ficus hispida* (Kadat), *Grewia microcos* (Myaya) and *Ficus glomerata* (Thapan) in Hlawga Wildlife Park. New Nwe Win (2013) studied the natural food of rhesus macaques in Pho Win Taung, the most preferred food items were leaves, flowers, buds and fruits of *Tamarindus indica* (Magyi). The leaves and fruits of *Capparis flavicans* (Saung-Kyan) were the second preference. The leaves of *Cymbopo ganvirgatus* (Myat-sat) and *Capparis horrida* (Namani-thanlyet) were in the third position.

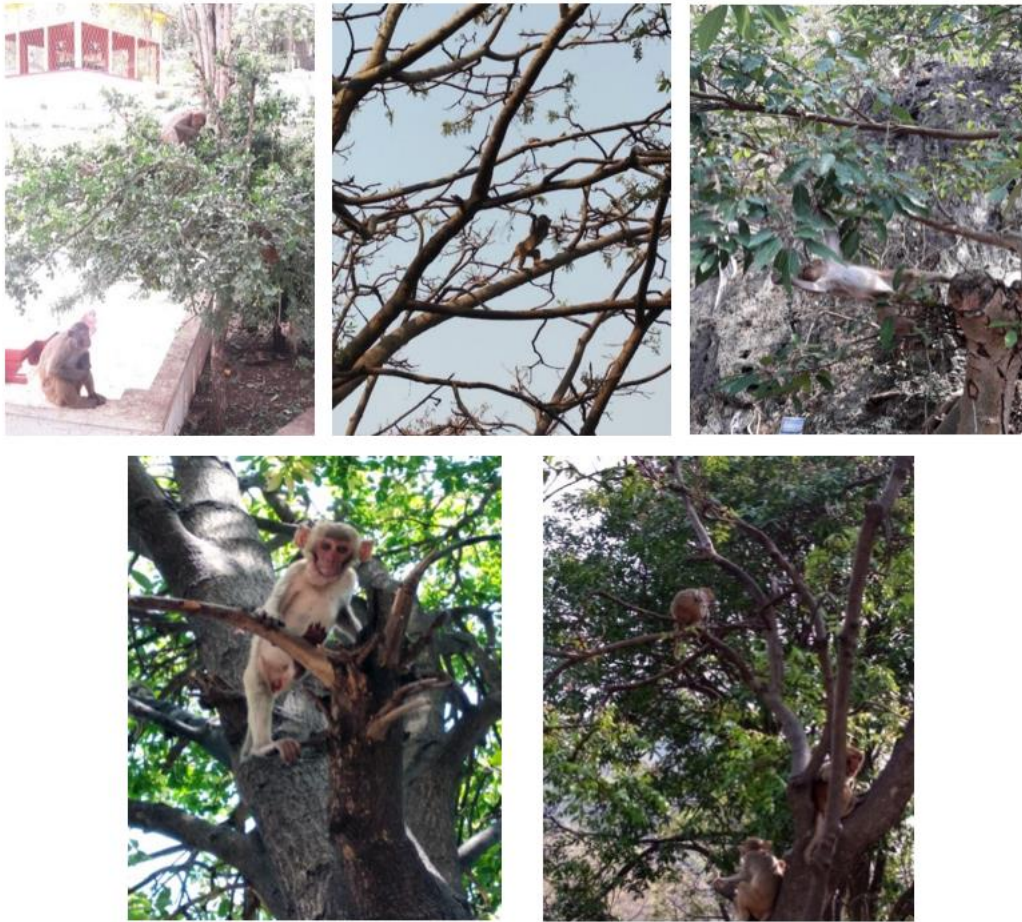


Plate .1 Foraging of rhesus monkey on natural food recorded in the study sites

Tin Htar Phyo (2016) studied that the feeding ecology of rhesus macaques in Shinmataung, rhesus monkeys are found to utilize 18 food plant species of 32 plant species. The most feeding food items were chick pea, biscuit, banana and maize. The provisioned food availability was highest in November 2015 due to festival. Wah Wah (2017) studied the feeding behavior of rhesus monkey in Popa Taungkalat, a total of 50 plant species were recorded under 27 families, comprising 34 tree species, four small tree species, six shrub species, two grass species and three climbers and one bamboo species. Rhesus macaques consumed parts of 48 species of plant, consuming fruit of 20 plant species, leaves of 45 plant species and flowers of 5 plant species as natural foods.

In the present study, rhesus monkeys are found to utilize 28 food plant species of 41 plant species in study area. The natural food of rhesus monkeys in study are preferred food items were leaves, fruits, flowers and bark of *Delonix regia* (Sein ban). The leaves, fruits and flowers of *Tamarindus indica* (Magyi), *Mangifera indica* (Thayet) and *Dalbergia glomeriflora* (Thit pagan) were the second preference. They consumed parts of 28 plant species, consuming leaves of 25 plant species, fruits of 14 plant species, flowers of eight plant species and bark of four plant species as natural foods.

Fleagle (1988) stated that rhesus macaque consumes leaves, fruits, berries, insects, grains, grass herbs and algae. Wolfe (1992) also recorded that common foods of macaque in temples include bread, bananas, peanuts, seeds, other fruits and vegetables. Fooden (2000) marked that in less human-influenced areas, they feed on fruits, flowers, leaves, seeds, gums, buds, grass, clover, roots, bark.

The present result highlights that rhesus monkey (*Macaca mulatta*) consumed both frugivorous and folivorous. But the most preferred plant species were *Delonix regia* (Sein ban), family Coelpliniaceae. Kumar and Solanki (2003) studied that rhesus macaque in semi-deciduous and tropical semi-evergreen forest of Pakhui Wildlife Sanctuary, Arunachal Pradesh, India during pre-monsoon and monsoon seasons. They ate 25 plant species, with a preference for 10 species and the order of preference varied in different months. In addition, Sengupta and Radhakrishna (2015) described that *Macaca mulatta* inhabits a variety of habitats and feeds on a range of food materials such as fruits, flowers, leaves, seeds, invertebrates, and human foods (Fooden, 2000; IUCN 2014). At the Buxa Tiger Reserve, India, they found a group of rhesus macaques to be highly frugivorous, with fruits constituting as much as 79% of their diet (Sengupta *et al.*, 2014).

During the study period, in January and February during the cool season was found to be the months with the highest total number of plants species eaten by monkey and followed by in March (22 plant species), in April (nine plant species), in May (with 10 plant species). During monsoon season, there were recorded in July (13 plant species), in June (12 plant species), in May and August (each with 10 plant species), in September (each with 15 plant species), in October (17 species), in November and December (18 species in each), in January and February (24 species in each) while the lower number of plant species were consumed in April (nine plant species).

According to the data the mainly food plant species were in family Moraceae (10%), Fabaceae (10%). Maximum numbers of natural foods feeding were observed in January and February 2020. Because of the least number of provisioned foods from pilgrims, minimum numbers of feeding observed in April 2019.

Naher *et al.*, (2016) stated that rhesus macaque was available on the basis of availability of ready foods rather than natural foods. They preferred to live in at the periphery of the forest where visitors were regularly travelling, as the visitors enjoyed supplying food and took photo and played with the macaques.

The environmental factors seem to be the cause of decreasing in the numbers of feeding. The food availability may be a limiting factor for their survival and distribution. During the study months, the feeding food items were chick-pea, banana, coconut, peanut, sunflower seed, mango, guava, bread, biscuits, cucumber, carrots, wafer, juices and maize. The provisioned foods availability was also in abundance because of near the urban at Yedaguntaung, They move less when food availability is high by provisioned, but when food scarcity occurs, they roam around the larger areas in search of food. The pilgrims and visitors and villagers were frequently visited, so the provisioned foods were in abundance for the monkeys.

Conclusion

Yedaguntaung is good habitat for rhesus monkeys. The feeding of rhesus macaque was found common through the year due to enough food supply, abundance of vegetation, less disturbance, provisioned food supply, situated artificial tanks and the abundance of habitats in Yedaguntaung are well adapted to this environment and it is one of the suitable places for them. The study gives a real time situation on field information that can be utilized for habitat assessment and management. The long-term preservation of the species, need to conserve and protect their habitat in Yedaguntaung area as well as the other parts of Myanmar.

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