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A Study on Food and Feeding of Mabuya Multifasciata Fit Zinger in Darrang District

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Abstract: ***Mabuya multifasciata is a skink belonging to the family Scincidae. It exhibits a broad geographical range throughout Asia with little genetic differentiation across the range. It appears to have excellent dispersal abilities both through natural and human mediated means. The study was aimed to determine the diet of Mabuya multifasciata on Darrang District of Assam. The ecolgy of the study sight also understood. In generally Mabuya multifasciata is aground dwelling skink. They also live in burrows. All the field data are collected in 2011-2012 at the study site in plain area. Assam and Burma are parts of Eastern Borderlands, a region largely of tertiary mountains, characterized by highly humid tropical climate and remarkable for the wealth and diversity of vegetation and flora. The study area Darrang district is situated in the eastern part of India on the north-east corner of Assam. Located on the bank of the mighty Brhmaputra , the district is largely plain. The district lies between 26°25´ and 26° 55´ northern latitude and 91° 45´ and 91° 20 ´eastern latitude. The present study was dealt with the food and feeding of Mabuya multifasciata in Darrang District. The common sun skink M. Multifasciata is an omnivorous species. The most common prey item in the species were spiders (Aranea), insect larvae, grasshoppers, crickets (Orthoptera), beetles (Coleoptera), small lizards and skinks. The average volume of food item each skink was higher in females than in males and the food volume was larger in wet season than the dry season. Ambient temperature, relative humidity and rainfall significantly influenced the prey item and prey volume consumed by the skink.***
Key words : Mabuya multifasciata, Darrang District, Food and feeding.

I. INTRODUCTION

Mabuya multifasciata is a skink belonging to the family Scincidae. It exhibits a broad geographical range throughout Asia with little genetic differentiation across the range. It appears to have excellent dispersal abilities both through natural and human mediated means.It is one of the most conspicuous lizards in this area of the world due to its size, as well as because it is diuranally active and thrieves in disturbed lowland habitats (Barley, Anthony ; Siler, Cameron).

This species is active diurnally in open areas where it can be found basking, however it can also be found hiding under bark, piles of vegetation and in tree holes. The food habit of Mabuya multifasciata(HelenKurniati, Agus H. Tjakrawidjaja&IbnuMaryanto).

As skinks are the poikilotherm reptiles, they requirethe sun's energy to regulate their body temperature, thus affecting their activity pattern. Previous studies have shown that temperature influences many biological process in organisms and has consequences on their habitat requirements and hence special distribution (Tinkle and Gibbons, 1977 ;Angilletta et al., 2002b ; Edwards and Richardson, 2004 ; Helland et al., 2007 ; Martin and Huey, 2008). It has shown on the earlier studies that peak activity generally correlates with higher air and substrate temperaturein other skink (Crawford and Thorpe, 1979 in Cheke, 1984).

The study was aimed to determine the diet of Mabuya multifasciata on Darrang District of Assam. The ecolgy of the study sight also understood.

Study Area :In generally Mabuya multifasciata is aground dwelling skink. They also live in burrows. All the field data are collected in 2011-2012 at the study site in plain area. Assam and Burma are parts of Eastern Borderlands, a region largely of tertiary mountains , characterized by highly humid tropical climate and remarkable for the wealth and diversity of vegetation and flora. The study area Darrang district is situated in the eastern part of India on the north-east corner of Assam. Located on the bank of the mighty Brhmaputra , the district is largely plain. The district lies between 26°25´ and 26° 55´ northern latitude and 91° 45´ and 91° 20 ´eastern latitude. As the area is covered by various plants and grasses it provides good nesting places on the burrows. They are also found on the pipes which were blocked by rocks, under the falling litters.

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A. Methods

Direct observations were made. The study was conducted on the habitat types in the study area. The sites were randomly selected .The habitats are defined by vegetataion. Most of the habitatas were dominated by the common grass species, ferns, etc. Each observation and all items consumed noted,, they were categorized into insects, lizerds, other. There was also a comment column for record the notes on activity like what it eat or not. Species of skink and an estimate of snout-vent length were made.

Interaction of the skink and observer being observed . Observation times were divided into morning (7am-11am), lunch (11am-2pm) and afternoon (2 pm-5pm).Weather data like maximum and minimum temperature of the day , rain (including any overnight or earlier in the day)were also recorded.

Faecal samples were collected and holding individuals for 24 hours and collecting any faeces. Opportunistic collection also made. Separate sample collection was made. Samples were kept in glass tubes which had species, data collected and habitat . These were air dried before being soaked in clean water and dissected under a microscope. Compete or near complete invertebrate parts, plant materials etc were removed and air dried again before being taped to 2mm graphpaper for further identification. Preservation of faecal materials was also done on 10% formalin for further identification.

B. Diet

1) Faecal analysis: In total 20 faecal samples were collected. Analysis of percentage of each food class was done. It indicates that invertebrates are the predominant food. Coleopteran species like beetle, Orthopteran species like cockroach, crickets, Arachnidan species like spiders, squamates like small lizards, Hymenopterans like ants are predominant. In different period of the season optional feeding was also noticed like some plant materials and others.
2) Data analysis :Percentage volume of each prey was calculated and estimated the volume (V) by the formula for a prolate spheroid (with π=3.14; Biavati et. al 2004; Valderrama et al. 2009; Caldart et al 2012; Ngo and Ngo 2013):

V = 4π/3 x (length /2) x (width/2)ˆ2

We used the reciprocal Simpson"s index to cal culate the dietary breadth of *Mabuya multifasciata* from Darrang District :

$$B = 1/ \sum_{i=1}^{n} Pi^2$$

Where i is the prey category and p is the proportion of the prey in category i, and n is the total number of prey categories (Krebs1999; Magurran 2004; Perez- Crespo et al. 2013). Percentage frequency of occurance (F) was also calculated, which is the percentage of stomachs containing each prey category, and the numeric percentages(N) of each prey item in the relation to all the prey items.Index of relative imporatance(IRI) to determine the importance of each prey category in the feeding ecology of *Mabuya multifasciata*. The IRI quotient provides a more informed estimation of prey consumption by using the three components in the following formula (Biavati et al. 2004; Leavitt and Fitzgerald 2009) :

IRI = %F + % N + % V/ 3

Where IRI is the relative importance index of each prey category , % F is occurance percentage , % N is numeric percentage , % V is volumetric percentage.

The faecal sample was dissected and taped to 2 mm graphpaper with the notes on the observed mater, habitat anad date of capture.

Table : Summary of morphological traits in *Mabuya multifasciata* from Darrang district. Morphological measurements are in milimeters. SVL= Snout-vent-length , HL= Head length, Hw= Head width, TL= Tail length

Adult male (n= 35)			**Adult female (n=35)**	
Trait	Mean= ± SD	Range	Mean= ± SD	Range
SVL	95 ±5.34	75-140	100±5.284	75-100

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HW/ SVL	0.294± 0.01	0.271-.121	0.30± 0.001	0.33-0.525
HL	35± 0.281	20-45	36± 1.38	25-42
TL	190± 2	150-160	200±0981	150-240
RTL	0.6785 ± 0.30	0.681-0.484	0666± 1.03	0.681-0.666
HW	28±0.201	25-48	30± 0.288	20-50

At least five visits per month were made to the study site during April 2011 and March 2012 (a total of 12 months) and collected 70 stomach contents (35 males and 35 females) of Mabuya multifasciata from five localities of Darrang district. Seasonal stomach contents during the study period was not significantly different (F 1,33= 1.789, p= 0.295), localities (F=4,52= 1.68, P= 0.288) or sexes (F1,68=1.45,P= 0.270). The largest male was 140 mm SVL and the largest female 100 mm SVL (Table). The smallest reproductive male was 75 mm SVL and 75 mm SVL in female. Identification of 128 food items in the diet of *Mabuya multifasciata* were found (125 animal items and 3 plant items)

Table: Number (N), Volume(V , mm^3), and frequency (F) of each category of prey in the diet of *Mabuya multifasciata* during pre-monsoon, monsoon and post-mpnsoon in Darrang District

Item	Season					
	Pre monsoon (Jan-May)		Monsoon (Jun-Sept)		Post monsoon (Oct-Dec)	
	N%	V%	N%	V%	N%	V%
Orthopterans	12(48)	200(65.4)	4(20)	4.6(1.9)	4(22.2)	8.2(6.2)
Hymenopterans	4(16)	41(13.4)	10(50)	216(91.6)	1(5.35)	4.2(3.8)
Coleopterans	7(28)	64(20.9)	5(25)	14.9(6.3)	12(66.6)	115.4(87.4)
Squamata	0(0)	0.68(0.2)	-	-	1(5.55)	4.2(31.8)
Aracnida	1(4)	0.05(0.053)	-	-	-	
Other	1(4)	0.05(0.053)	1(5)	-	-	
Total	25(100)	305.78(100)	20(100)	236.2(100)	18(100)	132(100)

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Table : The volume of food items (V,mm3) consumed by male and female *Mabuya multifasciata* in Darrang District

Category	n	Mean ± SD
Female	50	1300 ± 2999
Male	35	609.4 ± 534.2
Dry season	88	100.5 ± 200
Rainy season	90	150 ± 490

Average volume per male individual was 1300 ± 2999 mm3, compared to 609.4 ± 534.2 mm3 in female. The volume of food item was significantly different between seasons (F 1, 176= 5.29, p< 0.001).

II. DISCUSSION

Previous studies indicated that Mabuya multifasciata feeds primarily on grasshoppers, insect larvae,spiders (Truong 2005; Le 2008; Ngo et al 2014). The report on consumption of large food items such as snails and plant materials by Eutropis (E. Longicaudata & E. Macularia) was represented as first report. Under artificial condition this species consumed plant categories like banana, papaya, rice (Phung 2013). In the stomachs of other skinks of the genus Eutropis, plant items were found (Truong 2005,2013). This evidence reveals that Mabuya multifasciata is an omnivorous species.

A study from the central highland of Vietnam reveals that termites were the dominant species food item of E. Multifasciata (Ngo et al. 2014), that indicates that E. Multifasciata feeds on particular prey taxa according to its distribution.

It is shown by the early studies that lizard species, inhibiting tropical and moderate regions mainly eat insects and several other invertebrates (Lee 2008). In the present study we found that spiders,insects, insect larvae, small lizards and skinks , grasshoppers and crickets, beetles occupied a dominant position in prey categories.

Skinks in this study showed sexual dimorphism (SSD) between adult males and females. Adult female has larger average SVL than did female adults. This result is a contrast with those reported in China and Vietnam in viviparous skink species of Mabuya(Chung D. Ngo, 2015).

On tropical regions, fewer animals were captured during the wet season. But in this present study we collected relatively equal proportion (88 stomachs in dry and 90 stomachs in wet season). On average volume of prey consumed by female are larger than males and prey volume in the wet season are larger than the dry season. But in the regions of Vietnam and China the result is reverse (Lin et al 2008; Chung D. Ngo,2015).

As summary we can conclude that the common sun skink M. Multifasciata is an omnivorous species. The most common prey item in the species were spiders (Aranea), insect larvae, grasshoppers, crickets (Orthoptera), beetles (Coleoptera), small lizards and skinks. The average volume of food item each skink was higher in females than in males and the food volume was larger in wet season than the dry season. Ambient temperature, relative humidity and rainfall significantly influenced the prey item and prey volume consumed by the skink.

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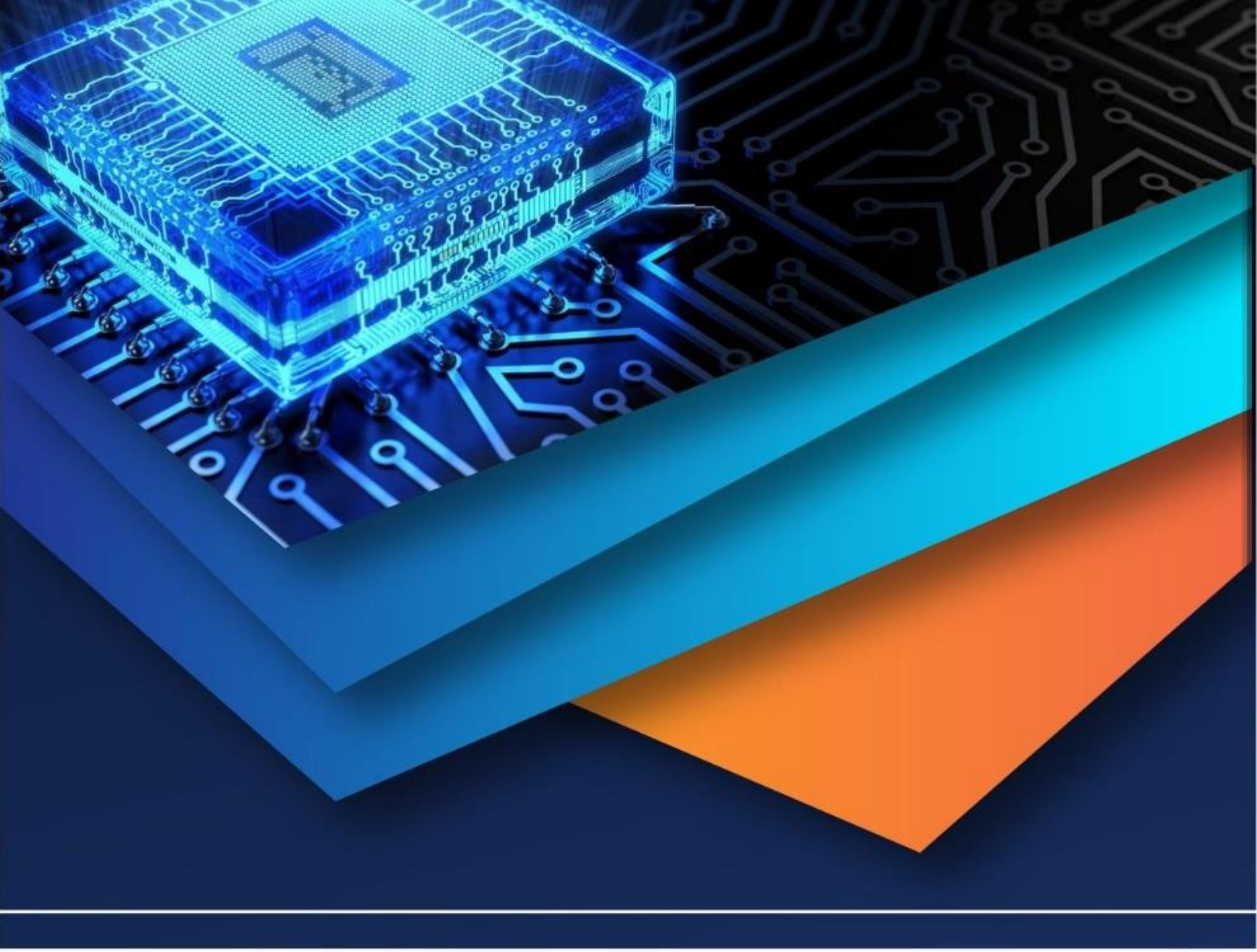

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