

Species Composition and Age Structure of Rat and Mice (Rodentia: Muridae) in Hlegu Township, Yangon Region, Myanmar

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Abstract:- Species Composition and Age Structure of Rat and Mice (Rodentia: Muridae) in Hlegu Township, Yangon Region, Myanmar was studied during the study period from June, 2016 to February, 2017. A total of six species of rodents, including three species of *Bandicota bengalensis*, *B. indica* and *B. savilei*, two species of *Rattus exulans* and *R. rattus* and only one species of *Mus cervicolor* were observed. In sex ratio, more number of female species was recorded than the male, except in *M. cervicolor*. Among different species of rats and mice, most of the male and female rats were found to be adults and few were juveniles in this study.

Keywords:- Sex Ratio; Rodent Species; Adults; Juveniles.

I. INTRODUCTION

Rodents are one of the dominant groups of mammals comprising more than 2700 species distributed throughout the world. Two-thirds of living rodent species belong to the family Muridae and both pests and non-pests rodents recorded in Asia belong to this family [4].

Rodents occupy a wide range of natural habitats, including forests and grassland, as well as the human modified world of agricultural landscapes, villages and townships. The family Muridae includes more than 1350 species, the majority of which are found in Eurasia, Africa and Australia. It includes many of the world's most familiar rodents, such as the house rats and house mice, and some of the most destructive of all agricultural pests [1].

All of the major pest rodent species classified under the family Muridae in South and Southeast Asia belong to only a handful of genera, among which are *Rattus*, *Bandicota* and *Mus*[1].

Many rodents can breed throughout the season if food and shelter are available. Rodents have high reproductive potential. In theoretically, one pair of rats can have 350 million offsprings within a period of three years. Estimations state that over 3.5 millions rats are being born daily globally [5].

Agricultural is a major component of the Myanmar economy, contributing 42 % to its GDP with 65 % of the labor force involved in agriculture. Presently, there are about 26.7 million acres of net sown area in Myanmar [5].

Rodent problems have a major impact in Myanmar during pre-harvest, where 75% of population residing in rural area and depend on agriculture for their livelihood [8].

The Australian Centre for International Agricultural Research (ACIAR) project (2003-2005) identified 19 rodent species in the agro-ecosystems of central and northern Myanmar, with eight likely to be pest species. The present work was conducted with the following objectives:

- to observe the species composition of rodent species in the study area
- to assess the trapping efficiency of rodent species in the field
- to investigate the sex ratio and age structure of the recorded murid species

II. MATERIALS AND METHODS

Mankone village at Hlegu Township is the study site located within E 96 ° 13'47.39'' and N 17° 08' 06.88''. This study was conducted in the field of Mankone village at Hlegu Township, Yangon Region during June, 2016 to February, 2017. The main growth stages of rice, based on a 145 days variety of rice (Taungpyanyin) (data from local farmers). Traps were set for four consecutive nights monthly at the village study site. Two types of traps were utilized; mouse killed traps and local killed traps. A total of 60 traps, including both types of traps, were used for each habitat. There were four transect lines (each 50 m long) in the field, containing 15 traps for each line. The distance between two traps was approximately 10 m from each other. They were set early in the evening and the captured animals were collected in the next early morning. Captured rodent species were collected in the early morning, recorded and identified individually, sexed, and weighed (using Pesola spring balance), tail length, ear length, hind foot length (without claw), head and body length were measured. Collected specimens were identified to species level with reference to a taxonomic key developed by [1]. The abundance of rodent species was expressed as total of all species of rats caught in each month. Relative abundance of each species was calculated. The recorded data were tabulated and shown as histograms, using Microsoft Excel Programme.

III. RESULTS

A. Species Composition of Rodent Species

A total of six species of rodents consisting three species of *Bandicota*, two species of *Rattus* and only one species of *Mus* were recorded in the field of Mankone village at Hlegu Township. The number of mole bandicoot

rat, *Bandicota bengalensis* was maximum relative to total abundance (24.1 %), followed by black rat, *Rattus rattus* at 23.9 %. Minimum abundance was recorded for Polynesian rat, *R. exulans* (4.5 %). Occurrence of short-tailed rice-field mouse, *Mus cervicolor*, was recorded only in small numbers at only 6.8 percent of total abundance (Table 1).

| No | Species | Common name | No. caught | Percent (%) |
|-------|------------------------------|-----------------------------|------------|-------------|
| 1 | <i>Bandicota bengalensis</i> | Mole bandicoot rat | 30 | 24.1 |
| 2 | <i>Bandicota indica</i> | Giant bandicoot | 8 | 9.1 |
| 3 | <i>Bandicota savilei</i> | Lesser bandicoot | 19 | 21.6 |
| 4 | <i>Rattus rattus</i> | Black rat | 21 | 23.9 |
| 5 | <i>Rattus exulans</i> | Polynesian rat | 4 | 4.5 |
| 6 | <i>Mus cervicolor</i> | Short-tail rice-field mouse | 6 | 6.8 |
| Total | | | 80 | 100 |

Table 1:- Species Composition of Rodent Species in the Study Site

B. Trapping Efficiency of Rodents

In the field of Mankone village at Hlegu Township, local kill trap and mouse kill trap were set for catching

different species rats and mice. More number of *R. rattus* was caught in mouse kill traps while more number of *B. bengalensis* was caught in local kill traps (Table 2).

| No | Species | Trap types | |
|-------------------|-----------------------|-----------------|-----------------|
| | | Mouse kill trap | Local kill trap |
| 1 | <i>B. bengalensis</i> | 16 | 14 |
| 2 | <i>B. indica</i> | 4 | 4 |
| 3 | <i>B. savilei</i> | 12 | 7 |
| 4 | <i>R. rattus</i> | 20 | 1 |
| 5 | <i>R. exulans</i> | 4 | - |
| 6 | <i>M. cervicolor</i> | 6 | - |
| Total | | 62 | 26 |
| No. of trap night | | 840 | 840 |
| Trap success (%) | | 7.4 | 3.1 |

Table 2:- Relative Abundance of Rodent Species Determined by Catch Number in Two Different Trap Types at Study Site

C. Sex Ratio of Rodent Species

The catchments of male and female of rats and mice species in study site were shown in Table 3. Sex ratios of *B. bengalensis* and *R. rattus* were calculated as 1:2

respectively. The sex ratios of male and female were calculated as 1:3 for *B. indica* and *R. exulans* respectively. Sex ratios of *B. savilei* and *M. cervicolor* were calculated as 2:1 and 1:1 respectively.

| No. | Species | No. of captures | Male | Female | Sex ratio |
|-------|-----------------------|-----------------|------|--------|-----------|
| 1. | <i>B. bengalensis</i> | 30 | 10 | 20 | 1:2 |
| 2. | <i>B. indica</i> | 8 | 2 | 6 | 1:3 |
| 3. | <i>B. savilei</i> | 19 | 6 | 13 | 1:2 |
| 4. | <i>R. rattus</i> | 21 | 7 | 14 | 1:2 |
| 5. | <i>R. exulans</i> | 4 | 1 | 3 | 1:3 |
| 6. | <i>M. cervicolor</i> | 6 | 3 | 3 | 1:1 |
| Total | | 88 | 29 | 59 | |

Table3:- Sex ratio of the recorded rodent species in the study site

D. Age Structure of Rodent Species

Among the recorded species, adult female rat numbers of *B. bengalensis*, *B. indica*, *B. savilei*, *R. exulans* and *R. rattus* were more than the adult males. In *M. cervicolor* adult males rats were predominant than the adult females (Table 4 and Fig. 1).

In the field of Mankone village at Hlegu Township, both adult and juvenile of all six species were recorded in the study period. Adults (n=62) appeared to be more abundant than the juveniles (n=26) in this study site and time. The maximum number of adult *B. bengalensis* (n = 19) was found in the study site, followed by adults of *B. savilei* and *R. rattus* (n = 14) respectively. The minimum number of adults was found in *R. exulans* (n = 3).

| No | Species | Age structure | | | | | | | |
|----|-----------------------|---------------|----|-------|------|----------|---|-------|-------|
| | | Adult | | | | Juvenile | | | |
| | | ♂ | ♀ | Total | | ♂ | ♀ | Total | |
| | | | | n | % | | | n | % |
| 1 | <i>B. bengalensis</i> | 6 | 13 | 19 | 63.3 | 4 | 7 | 11 | 36.67 |
| 2 | <i>B. indica</i> | 2 | 5 | 7 | 87.5 | - | 1 | 1 | 12.50 |
| 3 | <i>B. savilei</i> | 4 | 10 | 14 | 73.7 | 2 | 3 | 5 | 26.32 |
| 4 | <i>R. rattus</i> | 5 | 9 | 14 | 66.7 | 2 | 5 | 7 | 33.33 |
| 5 | <i>R. exulans</i> | 1 | 2 | 3 | 75.0 | - | 1 | 1 | 25.00 |
| 6 | <i>M. cervicolor</i> | 3 | 2 | 5 | 83.3 | - | 1 | 1 | 16.67 |

Table 4:- Number of Individuals Belonging to Different Age Structure of Recorded Rodent Species in the Study Site

(- = not recorded)

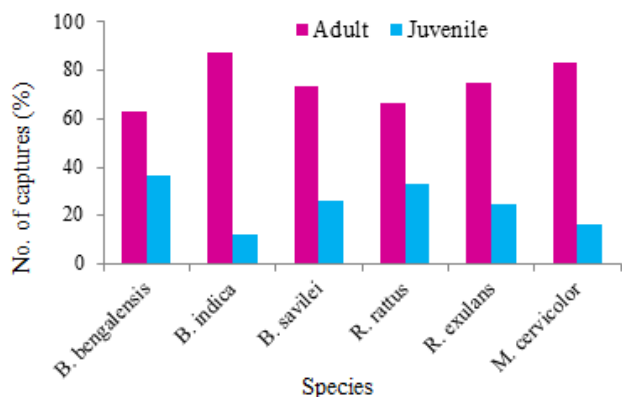


Fig 1:- Number of Individuals Belonging to Different Age Structure of Recorded Rodent Species in the Study Site

IV. DISCUSSION

A total of six rodent species recorded in the present study included three species of *Bandicota* (*B. bengalensis*, *B. indica*, *B. savilei*), two species of *Rattus* (*R. exulans* and *R. rattus*) and one species of *Mus* (*M. cervicolor*).

During the study period, the highest percentage of individuals occurred in *B. bengalensis* (24.1 %) followed by *R. rattus* (23.9 %) and *B. savilei* (21.6 %). It is assumed that there were many burrows near shed of livestock where they could get food and shelter in the study site.

In their study that the main pests in the rice field in Thailand were *B. bengalensis*, *B. savilei*, *B. indica* and *R. rattus*[2].

The burrows of bandicoot rats were usually found to be inhabited by a single adult rat per burrow [6] and [7].

Mouse kill trap was more successful (7.4 %) compared to local kill trap (3.1 %) because mouse kill trap act more effectively requiring only a mere touch while local kill trap needs force.

The mouse kill trap was found to be the most suitable. This may be due to the trigger system which is most sensitive and requires only a slight touch for the trap to press the targeted animal [9].

The number of females exceeded that of males regarding the abundance of rats and mice in the study site. Adult rat population number generally exceeded that of juvenile rats in the field. Not only the adults can survive in change of environmental conditions and can resist diseases than smaller animals but also adults were generally more active than juveniles and food sources are mainly sought after by the adults.

V. CONCLUSION

Species Composition and Age Structure of Rat and Mice (Rodentia: Muridae) in Hlegu Township, Yangon Region, Myanmar was investigated during the study period from June,2016 to February,2017. A total of six rodent species recorded in the present study included three species of *Bandicota*, two species of *Rattus* and one species of *Mus*. The tasks of the adults are to seek for the required food not only for themselves but also for their young. The age structure in the population thus plays a vital role during the reproductive period. Adults were generally active than juvenile as food sources are mainly sought after by the adults. This confirmed the fact that population size is related to the abundant supply of food.

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REFERENCES

- [1]. K.P. Aplin, P.R. Brown, J. Jacob, C.J. Krebs and G.R. Singleton. *Field methods for rodent studies in Asia and the Indo-Pacific*. ACIAR Monograph 100. Australian Centre for International Agricultural Research: Canberra. 223, 2003.
- [2]. P. Boonson, S. Hongnark, K. Suasa-ard, Y. Khoprasert, P. Promkerd, G. Hamarit, P. Nookarn, and T. Jakel. Rodent management in Thailand. In: *Ecologically-based Management of Rodent Pests*. (Eds. G. R. Singleton, L. A. Hinds, H. Leirs, and Z. Zhang.) 338-358. (Australian Centre for International Agricultural Research: Canberra.), 1999.
- [3]. Gesellschaft for Technische Zusammenarbeit (GTZ). *Manual on the Prevention of Post-harvest Grain Losses*. 283-289, 1996.
- [4]. D.W. Macdonald. *The New Encyclopedia of Mammals*. 2nd Edition. Andromeda: Oxford. 961, 2001.
- [5]. M.O.A.I. Rice varieties in Myanmar. Ministry of Agriculture and Irrigation. 25, 2004.
- [6]. R.M. Poche, M.Y. Main, M.E. Haque and P. Sultana. Rodent Damage and Burrowing Characteristics in Bangladesh Wheat Fields. *Journal of Wildlife Management*, 46: 139 -147, 1982.
- [7]. M.R. Rejasekharan and E. Dharmaraju. Studies of field rodents in Andhra Pradesh. In: *Proc All India Rodent Seminar* K. Krishnamurthy, G.C. Chaturvedi, and I. Prakash, eds. Ahmedabad, India. 54-55, 1975.
- [8]. G.R. Singleton. *Impacts of Rodents on Rice Production in Asia*. IRRI Discussion Paper Series No. 43. International Rice Research Institute, Los Banos, Philippines. 30, 2003.
- [9]. Yee Yee Lwin. Population dynamics and breeding ecology of rodent species in village ecosystem. *Ph. D Dissertation*. University of Yangon, Myanmar. 107, 2007.