

# Population structure and trap success of *bandicota indica* (bechstein, 1800) in the four allocated study sites Magway region in Myanmar

## Abstract

A total of *Bandicota indica* (324 rats) were trapped from four villages in four townships in Magway Region during June, 2016 to May, 2017. It is significant problem to farmers in agriculture and considered as the second most important pest after insects because it is the least controlled. The other rat species generally cause little crop damage. Trapping data revealed that the population abundance of rats changed over time in response to the availability of food resources. The peak population of *B. indica* in the rice fields occurred during the ripening, harvesting and booting stage of rice. The lowest number of bandicoot rat population was during the fallow and early growing stages. According to the monthly data, the maximum population of *B. indica* was found in October and minimum in April. Thus the population of *B. indica* needs to be regularly monitored in study area for reducing the damage of crops and to safeguard the yield.

**Keywords:** *Bandicota indica*, population structure, trap success, crop field, rats

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## Introduction

Small mammals are often considered as pests on agricultural land. The damage they inflict can occur at all stages of crop development; by digging up newly planted seeds, cutting tillers, destroying roots, direct grazing or consuming developing grain as the crop matures and reducing seed regeneration.<sup>1</sup> Rodents are a chronic agricultural problem in most areas of Lao PDR with sporadic outbreaks in upland agro-ecosystems.<sup>2</sup> Several species of murine rodents occur in the rice-fields of southern Asia.<sup>3</sup> Rats are becoming a most serious pest of rice in Asia causing annual pre-harvest losses of about 5-10%. In addition, to these losses, reports of 20% losses to grain post-harvest from rats are not unusual.<sup>4</sup>

The single most common rodent pest in rice field is *Rattus argentiventer* in Indonesia and Malaysia. In Bangladesh, the principal pest species are *Bandicota indica* and *Bandicota bengalensis*.<sup>5</sup> The present study was conducted on the most common rodent species in rice fields *Bandicota indica*, in the allocated four study sites in Magway Region, the results of which is hoped to provide some information and understanding on the population of *B. indica* in some of Magway Region.

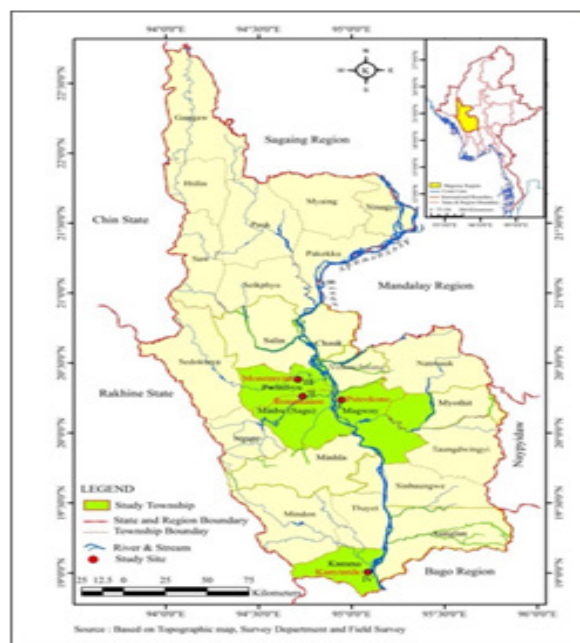
### The objectives of this research were:

1. To assess the population structure of *Bandicota indica* in four allocated study sites in Magway Region
2. To determine the trap success of *Bandicota indica* in study area

## Materials and methods

### Study area

Four study sites were chose because the most of farmers cultivated the rice and legume alternately year round in these areas. This opportunity is provided the abundance of food for Bandicoot rats. Catch area of Murinae was about 4 ha in each site (Figure 1).



**Figure 1** Map of Magway region.

**Sites I:** Puteekone village in Magway Township.

**Site II:** Bonemanoe village of Minbu (Sagu) Township.

**Site III:** Monemyint village of Pwintbyu Township.

**Site IV:** Kanyintile village of Kamma Township.

**Study period:** Between June, 2016 and May, 2017, rodent survey was conducted in Magway Region.

## Collection of the samples

Monthly trappings lasted for three consecutive nights per set in the four sampling locations. A total of 50 traps were placed around the study sites each night. The traps were set in the evening and collected the next morning at sun rise. Captured rats were recorded and identified individually, sexed, weight, length of tail, ear, hind foot (without claw) and head plus body were measured and recorded.

## Data analysis

Trap success was calculated as the number of rodents captured divided by the total number of traps set, multiplied by 100 (Figure 1).<sup>6</sup>

$$\text{Trap success} = \frac{\text{The number of rodents captured}}{\text{The total number of traps set}} * 100$$

## Results

### Population Structure of *Bandicota indica* in four study sites

The total 324 rats, 183 male rats and 141 female rats were recorded in study area. The highest number of *B. indica* was trapped in October (41 rats) and the lowest number was trapped in April (10

rats). Among the four study Townships, the highest numbers of *B. indica* were found in Kamma Township (107 rats) followed by 90 rats in Minbu (Sagu) Township, 73 rats in Pwintbyu Township and 54 rats in Magway Township (Table 1). According to ANOVA test, there was not significantly difference in monthly population of *Bandicota indica* rats among the study sites. In present study, according to the frequency distribution of body weight, the highest frequency number of male (56 rats) were found in size class (400-499g). The highest frequency number of female (49 rats) were also found in size class (400-499g) (Table 2). The mean body weight of male was 356.6 ± 120.5g and female was 368.6 ± 116.4g.

The highest frequency number of head and body length were found in size class 175-199mm in both male and female (Table 3). The lowest number in male was the size class (125-149mm) and in female was (100-124mm). The mean head and body length was 185.6 ± 35.7mm in male and 183.1 ± 36.9mm in female.

### Trap Success of *Banticota indica* in four study sites

The highest trap success percentage revealed in Kamma (5.94%) followed by Minbu (Sagu) (5%), Pwintbyu (4.06%) and Magway (3%) for the 1800 trap-nights of sampling (Table 4).

**Table 1** Monthly numbers of *Bandicota indica* recorded in four study sites during June, 2016 to May, 2017

Site	June (2016)	July (2016)	August (2016)	September (2016)	October (2016)	November (2016)	December (2016)	January (2017)	February (2017)	March (2017)	April (2017)	May (2017)	Total
Magway	3	4	5	5	7	5	6	4	4	3	3	5	54
Minbu (Sagu)	5	5	6	11	12	13	12	9	8	3	2	4	90
Pwintbyu	6	7	7	7	8	8	9	6	7	3	2	3	73
Kamma	7	5	7	13	14	14	12	11	12	4	3	5	107
Total	21	21	25	36	41	40	39	30	31	13	10	17	324

**Table 2** Frequency distribution of body weight of males and females *Bandicota indica* recorded from all study sites

Body weight (g)	Male	Female	Total
100-199	26	17	43
200-299	29	18	47
300-399	53	42	95
400-499	56	49	105
500-599	19	15	34
Total	183	141	324

**Table 3** Frequency distribution of head and body length of males and females *Bandicota indica* recorded in all study sites

Head and body length (mm)	Male	Female	Total
100-124	16	11	27
125-149	12	16	28
150-174	28	28	56
175-199	68	38	106
200-224	28	25	53
225-249	31	23	54
Total	183	141	324

**Table 4** Number and percentages trap success of *Bandicota indica* in each site during June, 2016 to May, 2017

Site	Total number of rats captured	Captured percentage (%)	Total number of trap set	Trapping success (%)
Magway	54	16.67	1800	3
Minbu (Sagu)	90	27.78	1800	5
Pwintbyu	73	22.53	1800	4.06
Kamma	107	33.02	1800	5.94
Total	324			

## Discussion

During the present study, four townships were allocated in Magway Region because these sites have various farms and orchards. *Bandicota indica* is one of the key pests in the rice fields and crop farms. The population of *B. indica* was the highest in October (41 rat) and the lowest in April (10 rat), due to the ripening of paddy during the month of October and the post-harvest was in April in study area. The rodent population density increased after the onset of short rains. This change can also be interpreted due to variations in food supply and plant cover.<sup>7</sup>

In present study, the mean body weight of female ( $368.6 \pm 16.4$  g) was higher than mean body weight of male ( $356.6 \pm 120.5$  g). Especially, body weight of female increased during the pregnant time. The higher frequency of rats were found in body weight size classes (300–399g) and (400–499g) in both sex. According to the population of rat, the male rats more frequently encountered than female. The relative excess of males may result from their greater activity and larger home range, which would tend to produce a higher probability of capture than that of the females.<sup>7</sup> These finding are consistent with the results of the present study. The adult males were captured more frequently than adult females in all studied sites. Therefore, it indicated that were more dominant, were more active and tend to move farther than the adult females. The prevalence of pregnancy was related to body size of the female. It is indicated that the pregnant female of Bandicoot rat increased body size.<sup>8</sup>

The month of June and July are for ploughing and preparation for planting of rice. The actual planting of rice occurs in September and October. The booting and ripen time of rice occur in November and December. Since food sources of rats are abundant in study area thus gain in weight for female bandicoot rat. The differences in the timing of food availability may also affect growth patterns of rat population, which may alter their population structure in different environments. To increase food availability may occur, increased individual growth rates, resulting in more rapid maturation and higher abundance of adults, increased reproductive effort per adult. All responses are likely to lead to increase population densities.<sup>1</sup>

In the present study, Kamma supported the largest rice field area than other study sites thus the rice are main crop plants in this area. The highest population densities of greater bandicoot rat were recorded in Kamma Township. Therefore highest trap success was observed in Kamma Township. The population status of greater bandicoot rat revealed to be very important in Magway Region in order to implement efficient management at the right time. The population and behavioral ecology of the rodents are important for outline efficient control measures to be implemented in safeguarding the crop yield.<sup>9,10</sup>

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None.

## Conflicts of interest

Author declares that there are no conflicts of interest.

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