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Relative Abundance of Rodent Species in Different Crop Stages of Paddy Field, Hlegu Township, Yangon Region

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Abstract:- Relative abundance of rodent species in different crop stages of paddy field, Hlegu Township, Yangon Region 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. The relative abundance of rodents in the field varied with different crop stages of rice. The most common species were *B. bengalensis, B. savilei* and *R. rattus*. Higher numbers of the recorded rodent species were found at harvesting stage of cultivated crops. The peak populations of rodents in the field depended on the amount of available food and shelter.

Keywords:- *Abundance; Rodent Species; Harvesting.*

I. INTRODUCTION

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].

Rodents are most important mammalian agricultural pests at the global level. Rats damage and destroy many crops prior to harvest and also are a major pest for grain stored post-harvest. Too little is known worldwide about the amount and value of damage inflicted annually by rodents [9].

Rodent damage in the field can occur during all crops stages but often it is most serious at planting time and just before harvest [11].

Rice is the staple food in most Asian countries and more than 90 % of the world's rice is produced in Asia as reported by [6]. [10] conducted a comprehensive review of the impact of rodent pest on the rice-based agricultural systems in 11 Asian countries: Bangladesh, Cambodia, People's Republic of China, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippine, Thailand and Vietnam. Rats were the number one pre-harvest pest in rice crops or were in the top three pests in most of these countries.

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 [13].

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].

In Myanmar 75 % of the population are farmers cultivating mainly rice which has been attacked by insect pest as well as a number of rodents. No particular records on the impact of rodents in the rice dominated agricultural system are available and the loss of affected individual farmers can be within the range of 5-40%. Moreover, the poorer communities suffer the most by the impact of the rodents because they do not have the knowledge base or living conditions to minimize the losses of, post harvest crop or to reduce rodent contamination of food and drinking water [10].

The work on the relative abundance of the rodents in houses and paddy fields are still rare in Myanmar. Hence the present work was conducted with the following objectives:

- to observe the species composition of rodent species in the study area
- to study the relative abundance of the recorded rodents at different crop stages

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) are: tillering stage (55 days long), reproductive stage including booting and flowering stage (35 days) and ripening stage (55 days) (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 bardicoot 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	*Bandicota bengalensis*	Mole bandicoot rat	30	24.1
2	*Bandicota indica*	Giant bandicoot	8	9.1
3	*Bandicota savilei*	Lesser bandicoot	19	21.6
4	*Rattus rattus*	Black rat	21	23.9
5	*Rattus exulans*	Polynesian rat	4	4.5
6	*Mus cervicolor*	Short-tail rice-field mouse	6	6.8
	Total		80	100

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

B. Relative Abundance of Rodent Species at Different Crop Stages

Abundance of the recorded six rodent species (*B. bengalensis, B. indica, B. savilei, R. rattus, R. exulans* and *M. cervicolor*) at different stages of rice crop was found to be different (Table 2 and Fig. 1).

A total of 30 Bandicoots (*B. bengalensis*) were collected occurring at different crop stages in the study site. In harvesting stage, the highest population was observed (43.33%) and followed by the ripening stage (26.67%). The lowest number (10.10%) was observed in the tillering stage of the crop.

A total of eight numbers of rats (*B. indica*) were collected during different crop stages. The highest number of population (62.50%) was observed in the harvesting stage followed by ripening stage (37.50%). None of the species were observed in tillering and flowering and booting stages.

A total of 19 rats (*B. savilei*) were recorded in the study site in which they were occurred abundantly at different crop stages. The highest number of population (42.10%) was observed in the harvesting stages followed by ripening stage (31.58 %). The lowest number was observed in the tillering stage (10.54 %).

A total of 25 rats (*R. rattus*) were collected in the field with varying number of population at different crop stages. The highest population (47.62%) was observed in harvesting stage and the second highest (23.80%) was found in the ripening stage. The lowest number (9.52 %) was observed in the tillering stage.

A total of only four rats (*R. exulans*) were collected at the tillering stage of the rice crop. No rats were collected at the other stages of the crop.

A total of six mice (*M. cervicolor*) were collected during all crop stages. The highest number (66.67%) was found in harvesting stage followed by tillering stage (33.33%). None was observed both booting and flowering stage and ripening stage.

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Species	Crop Stages			
	Tillering	Booting & flowering	Ripening	Harvesting
B. bengalensis	10.10% (n = 3)	20.00% (n = 6)	26.67 % (n = 8)	43.33 % (n = 13)
B. indica	-	-	37.5 % (n = 3)	62.50 % (n = 5)
B. savilei	10.54 % (n = 2)	15.78 % (n = 3)	31.58 % (n = 6)	42.10 % (n = 8)
R. rattus	9.52 % (n = 2)	19.05 % (n = 4)	23.80 % (n = 5)	47.62 % (n = 10)
R. exulans	0.16 % (n = 4)	-	-	-
M. cervicolor	33.33 % (n = 2)	-	-	66.67 % (n = 4)
Total	14.77 % (n = 13)	14.77 % (n = 13)	25.00 % (n = 22)	45.46 % (n = 40)

Table 2:- Changes in Abundance of Each Rodent Species Recorded at Different Crop Stages

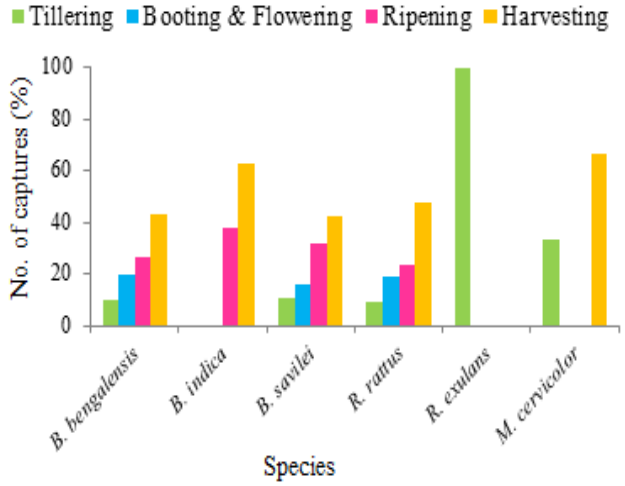

Fig 1:- Relative Abundance of Rodent Species at Difference Crop Stages in the Study Site

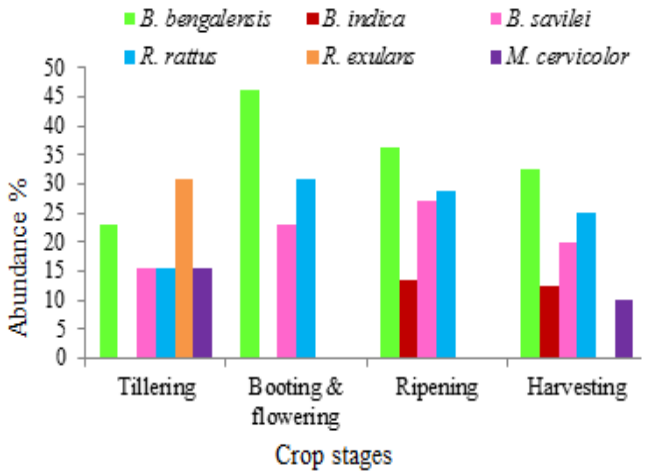

Fig 2:- Changes in Abundance of Rodent Species at Different Crop Stages

C. Changes in Total Abundance of Rodent Species at Different Crop Stages

A total of 88 rats and mice occurring at different crop stages of tillering, booting and flowering, ripening and harvesting stages were recorded in varying number for each stage. The most abundant total rodent population was observed in harvesting stage (45.46 %) followed by ripening stage (25.00 %). The lowest total population appeared in tillering stage and booting and flowering stage (14.77 %) (Table 2 and Fig. 2).

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. bengolensis* (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* [3].

The lesser number of *R. exulans* were recorded in the field because they mostly lived in the village and when the food in village became scarce they came out from the village to the rice field. *Mus* sp. was the least recorded because it commonly moved only a few distances from its nests site to get food.

When it can live in food, for example in sacked grain, it does so, and then it may never emerge from the sack. It can live without access to water. This confirmed the fact that population size is related to the abundant supply of food [2].

The number of *B. bengalensis* gradually increased starting from tillering stage to harvesting stage. *B. bengalensis* was more abundant at harvesting stage not only because of more food availability but also because there was heavy rain and flood in the field during the tillering stage. Abundance of rodent species depends on weather, abundance of food, predators and habitat availability.

R. rattus was abundant at the harvesting stages during the study period. This finding is in agreement with [1] who said that abundance of *R. rattus* fluctuated in direct relation to cycle of crop maturation and harvest.

The harvesting stage of the rice crop had highest abundance of rodent species in the study period. The peaks of abundance were recorded to coincide with the harvest time of rice due to large supply of food is available during these periods [12].

This finding thus indicates that the population status of the rodent species is associated with rich food source.

The second most abundance of rodent population was observed in the ripening stages. The population growth was closely associated with the ripening of the crop when quantity of food was abundant [5].

The present results are similar to that of [7] and [8] who stated that the breeding seasons correspond closely with the reproductive and ripening stages of the rice crop and suggested that nutritional factors were particularly required at the reproductive stage.

Similarly, most of the rodent species seem to stop breeding during periods of extended fallow, when food was scarce or of low quality [4].

Many aspects of rodent ecology and behavior are density dependent, they responded to changes in population density. A simple example is a shift in diet from one foodstuff to another when population pressure starts to limit access to the various food resources [1].

V. CONCLUSION

Relative abundance of rodent species in different crop stages of paddy in Hlegu Township, Yangon Region 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 data obtained in the present study covered mainly on the population of the rodent species during various stages of the rice crop in the paddy fields. The information given would surely serve as an invaluable source for the farmers in the application of control management. It has also highlighted the important role of systematic and hygienic conditions of the environment to prevent their cultivated fields from destruction of the rodent species. It is therefore concluded that the farmers should taken the important information into account to prevent yield loss caused by the rodents.

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