

Exploration on the Status of the Lesser Bandicoot-Rat, *Bandicota bengalensis* Gray in Wheat Crop

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Abstract The population structure of murids in wheat crop revealed a combination of *Bandicota bengalensis*, *Rattus meltada*, *Tatera indica* and *Mus booduga*. The percentage occurrence of these murids ha⁻¹ area was estimated to be 53.2, 22.9, 19.4 and 4.5 respectively. The trap index calculated at different stages of wheat crop fell between 0.13 and 0.41. A low population density of *B. bengalensis* was recorded at the seedling stage which gradually enhanced with the advancement of the crop growth. More number of young ones were trapped during the months of March and April which coincided with maturity stage of the crop. Cannibalism was noticed in cages. *B. bengalensis* has been proved to be the most efficient hoarder and a damage of about 90.6 kg ha⁻¹ has been estimated in wheat crop.

Key words Murid Population density, Damage, Trap index

Murids, because of their great economic importance in various terrestrial ecosystems, have been entrapping attention of the scientists. The lesser bandicoot-rat, *Bandicota bengalensis* has been considered the most vulnerable field or rural rat causing heavy damage to grain in cultivated fields and ware houses. The present agricultural situation, thus, necessitates more insight to its crop status vis-a-vis management.

Materials and Methods

Monthly population fluctuations of sympatric murids in wheat crop (November 1990 to June 1991) at village Dabra of district Hisar were estimated. 'Lincoln Index' was calculated following CMR method of Davis (1964). Following Prakash (1962) 'Trap Index' was reckoned by trapping lines across the area under study. Coarsely ground wheat, bajra, gram mixed with additives like cooking oil or peanut butter was used as a bait material.

For determining the periodicity of reproduction, monthly variation in the number of adult and sub-adult animals captured in one hectare was recorded throughout the existence of wheat crop.

Impact of intra and inter-specific competition among four species in wheat crop was analysed based on the extent of injuries/deaths inflicted to the animals caught in multiple catch traps.

To analyse stomach contents, the animals were sacrificed immediately after their capture and the whole stomach was preserved in 5% formaline. The contents were emptied into Petri dishes by making a puncture in the stomach. Quantitative estimation of different food materials in the stomach was made by frequency of occurrence and relative occurrence of different items in the stomach. The data was pooled and analysed statistically.

Damage assessment to wheat crop by *B. bengalensis* was estimated following Srivastava *et al.* (1975).

Results and Discussion

Population structure and census

Wheat crop has approximately a duration of six months, i.e. from the 3rd week of November to the end of April. The population analysis of field murids in the crop revealed the co-existence of *Bandicota bengalensis*, *Tatera indica*, *Rattus meltada* and *Mus booduga*. The percentage occurrence of these murids in the field varied from each other (Table 1). The population density fluctuated within wide limits of 17.3 in November and 73.0 in April. The trappability of *B. bengalensis* was the highest and followed *R. meltada*, *T. indica* and *M. booduga*. *M. booduga*, however, was not encountered during the first three months of the crop. Intra and inter -

Table 1 Population fluctuations of various murids in a wheat field

Murid species	Population density								Total	% density
	Nov.	Dec.	Jan.	Feb.	March	April	May	June		
<i>B. Bengalensis</i>	7.8	12.8	16.5	19.0	27.5	40.2	20.0	17.5	161.3	53.15
<i>R. meliada</i>	5.8	4.7	6.5	6.6	13.1	16.8	7.5	8.5	69.5	22.89
<i>T. indica</i>	3.7	4.5	4.0	7.0	9.5	12.8	6.5	11.0	59.0	19.44
<i>M. booduga</i>	—	—	—	2.5	3.0	3.2	2.0	3.0	13.7	4.52
Total	17.3	22.0	27.0	35.1	53.1	73.0	36.0	40.0	303.5	100.00

specific combinations were often noticed within a range of 1 to 7 individuals per cage. Trap index was found to be 0.13, 0.20 and 0.41 at seedling, vegetative and maturity stages of the crop respectively.

Of the various murid species captured at different stages of the wheat crop, the population of *B. bengalensis* depicted a linear correlation with growth of the crop. The trappability indicated that the relative abundance of this species increased with the advancement of the crop. At seedling stage, a comparatively low density of *B. bengalensis* was observed comprising on an average 8.7 animals per hectare. At vegetative stage there was an increase in population to an average of 18.9 animals which ultimately reached to 37.5 individuals at maturity stage. These observations obviously revealed a strong preference of earheads by this murid. This peak in the population density may, thus, be correlated with the availability of sufficient food and shelter in the crop field (Sood & Ubi 1975, Kumar & Pasahan 1991). At post harvest stage of the crop when the field was left fallow, however, the population of *B. bengalensis* declined sharply to an average of 25.2 individuals. Hence there was a low level of damage to the crop at the seedling stage and a comparatively higher degree of damage at the maturity stage (Kumar & Pasahan 1992).

Reproductive periods

The population of *B. bengalensis* was quite low between November and January as only a few number of youngones of the species were trapped. However, the population depicted a slight rise during the preceeding month and further flourished evidently during the months of March and April. The latter, thus, coincided with the maturity stage of the crop when more number of youngones were caught (Table 2). The population then ex-

hibited a steep decline during the post-harvest period of the crop. Sagar and Bindra (1973) and Shekhar (1990) have also noticed in *B. bengalensis* two different breeding seasons i.e. one around March to April and the other around August to September corresponding to the maturity stage of the crops. Thus, periodicity of bandicoot reproduction in wheat crop could be correlated with the availability of food and shelter, consequent of which more number of youngones were trapped (Sood & Ubi 1975). The sex ratio of *B. bengalensis* has been found almost equal during the months of February to May while the rest of the period depicted the number of males always exceeding females (Table 2).

Intra and inter specific competitions

The intra and inter-specific competitions were apparent in wheat fields from March to April. Whenever two or more hetero specific species were caught in the same multiple catch trap, they invariably fought amongst themselves resulting in killing or injuring the weaker animal. Of all the 24 cases recorded, it was found that *B. bengalensis*

Table 2 Monthly fluctuations in sex and size of *B. bengalensis*

Month	Sex		size	
	Male (%)	Female (%)	Adult (%)	Sub-adult (%)
November	66.67	33.33	68.67	31.33
December	62.50	37.50	70.83	29.17
January	59.33	40.67	71.25	28.75
February	55.51	44.49	62.64	37.36
March	53.67	46.33	55.67	44.33
April	51.25	48.75	53.87	46.13
May	59.25	40.75	69.50	30.50
June	63.50	36.50	70.70	29.30

destroyed individuals of almost every other species. Male *B. bengalensis* was often found aggressive over the female one. The murids presently caught revealed the following order of aggressiveness: *B. bengalensis*, *T. indica*, *R. meltada* and *M. booduga*.

The shortage of food and shelter would increase the intra and inter-specific competitions and aggressiveness among rodent species which result in the decrease of population either through mortality or migration (Jain & Tripathi 1988). Cannibalism was noticed in the traps of *B. bengalensis*, *T. indica* and *R. meltada*. Partial to full cannibalistic activity has also been reported by Jain (1984) on new born youngones. It can, thus, be concluded that intra-and inter-specific competitions have a great impact on the fluctuating mechanism of murid population.

Stomach contents

Stomach content analysis recorded a larger volume of the food containing green vegetative matter (70.80%) including stems, leaves and roots of herbs and plants (Table 3). The animal component of food consisting mainly of arthropods, accounted 6.0% of the total volume. Chakraborty (1975) found mollusks, insects, arachids, earthworms in the stomach content of this species. The green vegetative matter which was more during the months of November to February was found to be less during the maturity stage of wheat. Consequently, there was an overall switching over of food from green vegetative matter to wheat grains. Animal remains encountered all through the existence of wheat crop were found comparatively more during the months of November to December and May to June obviously corresponding to insufficient availability of vegetative matter in the fields. A total of 6.2 per cent volume of the food material, however, remained unidentified. Mohana Rao (1983) reported that the stomach contents of *B. bengalensis* comprised of 52.15% green vegetative matter, 31% grains and 4% animal matter.

Damage

Per cent damaged plants were 2.2, 4.1 and 10.5 at seedling, growth and maturity stages of wheat crop respectively corresponding to the rodent population density. This is in conformity with that of Srivastava *et al.* (1975). Singh and Saxena (1989)

Table 2 Monthly variations (%) in the stomach contents of *B. bengalensis*

Month	Green vegetative matter	Grain content	Animal remains	Unidentified
November	78	4	7	11
December	81	2	10	7
January	87	0	6	12
February	96	0	1	3
March	46	48	2	4
April	34	60	3	3
May	60	21	11	8
June	88	2	8	2
Average %	70.8	17.0	6.0	6.2

registered damage in wheat crop by *B. bengalensis* to the tune of 0.24 to 1.60%.

At post-harvest stage of wheat crop, a total number of 40 living burrows of *B. bengalensis* was encountered in one hectare. Sixteen burrows randomly were excavated and the mean amount of wheat grains sorted per burrow was estimated as 1.28 kg and thus amounting to 51.4 kg ha⁻¹. This is in conformity with the findings of Dubey and Patel (1989) who reported the loss of 80.4 kg ha⁻¹ grains by this species through hoarding.

During maturity stage of the crop (i.e. about 40 days) the adult bandicoots had assumed feeding upon earheads of wheat plants directly. Taking average number of the animals ha⁻¹ as 36.8 and daily consumption of 20g, the total damage done to wheat crop was calculated to be 29.44 kg. It is further understood that the rat consumes only two third of each grain (Chakraborty 1975). Consequently, during 40 days of maturity period of the crop 9.81 kg. of grains were just destroyed in the fields. Thus, the total loss incurred by *B. bengalensis* to wheat crop was estimated to be 90.65 kg ha⁻¹.

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