

Small Mammals Inhabiting Village Households and Farm Houses of Central Punjab (Pakistan)

MUHAMMAD MUSHTAQ-UL-HASSAN, MIRZA AZHAR BEG, AKBAR ALI KHAN AND
MUHAMMAD MAHMOOD-UL-HASSAN

Department of Zoology, University of Agriculture, Faisalabad, Pakistan

Abstract. Four species of small mammals, namely, house rat (*Rattus rattus*), house mouse (*Mus musculus*), Indian gerbil (*Tatera indica*), and house shrew (*Suncus murinus*) were recorded from 87 village households of 12 villages and 26 farm houses. In the household communities, *R. rattus* (74%) and *M. musculus* (18%) were the proportionally dominant species which were followed by *S. murinus* (7%) and *T. indica* (1%). In the farm houses, *R. rattus* (63%) and *T. indica* (22%) were the dominant species which were followed by *S. murinus* (8%) and *M. musculus* (7%). In the combined data the proportions of *R. rattus*, *M. musculus*, *T. indica* and *S. murinus* were 71%, 15%, 7% and 7%, respectively.

Key words: Rats, mouse, shrews, relative abundance, trap success.

INTRODUCTION

Small mammals and particularly the rats and mice living in the human habitations destroy and contaminate food stuffs and disseminate diseases like salmonellosis, hepatitis A, plague, and murine typhus (Ghazi, 1990). Human dwellings and shops in Faisalabad city have been found infested with house rat (*Rattus rattus*), house mouse (*Mus musculus*), and common shrew (*Suncus murinus*) where the rat constitutes 75% to 97% of the trapped populations (Ali, 1990; Khan, 1990). The same three species have been found to affect the wholesale grain markets of the cities of the Punjab (Pakistan) where *R. rattus* constitutes 97.9% of the small mammals (Ahmad *et al.*, 1988). In the village houses and godowns of the Indian desert of Rajasthan (Advani, 1984) and in villages and towns around Hapur city (U.P., India) (Krishnamurthy *et al.*, 1967) the house rat is the dominant species. In Calcutta, the house rat has almost completely lost to the lesser bandicoot rat (*Bandicota bengalensis*) (Spillett, 1968). A similar sort of thing has happened in favour of *B. bengalensis* in Bombay (Deoras, 1963; Seal, 1960). Further east in the farm households of Bangladesh where five species of small mammals, namely, *R. rattus*, *M. musculus*, *B. bengalensis*, *S. murinus* and large Indian bandicoot rat (*Bandicota indica*) occur, only 5.1% of the community was due to *R. rattus* (Mian *et al.*, 1987). In the Far Eastern store houses of Taichung area of Taiwan, *R. rattus* accounts for only 3.8% of all the small mammals (Ku and Lin,

1980). The present paper documents information about the abundance of small mammals in the village households and farm houses of the central Punjab (Pakistan).

MATERIAL AND METHODS

Twelve randomly selected villages, all located within a radius of 70 km of Faisalabad city, were sampled for small mammals from July, 1987 through June, 1990. From these 12 villages, 63 households, 16 shops, and eight flour mills were randomly selected and snap trapped. In addition to these, 26 farm houses located in fields at varying distances from the villages were also trapped. The trapping was carried out using metallic rat traps (17x9.5 cm) and wooden McGill mouse traps (10x4.5 cm). Depending on their size and complexities, various structures were served with 6 to 18 traps. In all, 90 traps were set for five successive nights each month, the only exception being the month of February of each of the three years during which only 63 traps were set. The rat and mouse traps were set in 2:1 ratio in each structure. The traps were baited with "roti" (bread). Each of the captured animals was tagged with a field number before being brought to the laboratory for identification. For further details see Mushtaq-ul-Hassan *et al.* (1995a,b).

RESULTS

-From the village houses, flour mills, and shops (hereafter all these jointly designated as village

located in the vicinity of the same 12 villages, four species of small mammals viz., house rat (*R. rattus*), house mouse (*M. musculus*), Indian gerbil (*T. indica*), and house shrew (*S. murinus*) were recorded.

Village households

In the village household samples, the proportion of *R. rattus* varied from 71% (in winter) to 77% (in spring); the average for all the seasons being 74%. The proportion of *M. musculus* ranged from 7% (in fall) to 24% (in winter) with an average of 18%. *T. indica* was represented in only the fall (3%) and winter (2%) samples and constituted just 1% of the total catch. The proportion of *S. murinus* varied from 1% (in spring) to 16% (in fall) and the average for all the four seasons was 7% (Table I).

Table I.- Relative abundance of small mammals in the village households and farm houses of central Punjab.

Seasons	Percent (No. animals)			
	<i>R. rattus</i>	<i>M. musculus</i>	<i>T. indica</i>	<i>S. murinus</i>
Village households				
Summer	76 (294)	19 (73)	0	5 (19)
Fall	74 (278)	7 (27)	3 (12)	16 (61)
Winter	71 (221)	24 (73)	2 (6)	3 (10)
Spring	77 (267)	22 (78)	0	1 (3)
Av.(Total)	74 (1060)	18 (251)	1 (18)	7 (93)
Farm houses				
Summer	41 (82)	10 (20)	47 (93)	2 (4)
Fall	60 (78)	5 (7)	14 (18)	21 (27)
Winter	86 (122)	4 (6)	5 (7)	5 (7)
Spring	88 (63)	6 (4)	0	7 (5)
Av.(Total)	63 (345)	7 (37)	22 (118)	8 (43)
Combined				
Summer	64 (376)	16 (93)	16 (93)	4 (23)
Fall	70 (356)	7 (34)	6 (30)	17 (88)
Winter	76 (343)	17 (79)	3 (13)	4 (17)
Spring	79 (330)	20 (82)	0	2 (8)
Av.(Total)	71 (1405)	15 (288)	7 (136)	7 (136)

The average number of specimens of the three species in the samples from the village households varied significantly ($F=140.077$; $d.f.=2,12$; $P<.01$); *R. rattus* being the most dominant species followed by *M. musculus* and *S. murinus*, *T. indica* was not included in the analysis on account of insufficient data.

Farm houses

The proportion of *R. rattus* in the seasonal samples taken from the farm houses ranged from 41% (in summer) to 88% (in spring). The average for all the four seasons was 63% of the entire sample. The proportion of *M. musculus*, *T. indica* and *S. murinus* averaged 7%, 22% and 8%, respectively (Table I).

The effect of seasons ($F=5.91$; $d.f.=3,18$; $P<.01$) and species ($F=45.59$; $d.f.=3,18$; $P<.01$) on the proportions of the small mammals was significant. The interaction between seasons and species was also significant ($F=5.57$; $d.f.=9,18$; $P<.01$). The Duncan's multiple range tests revealed that the means of summer and spring seasons were significantly different from each other but none of the two was different from the fall and winter samples. The average number of *R. rattus* for all the seasons was significantly different from the similar average of the other three species.

Combined data

In the combined data of the village households and farm houses, the proportion of *R. rattus* in the seasonal samples varied from 64% (in summer) to 79% (in spring), of *M. musculus* from 7% (in fall) to 20% (in spring), of *T. indica* from 0% (in spring) to 16% (in summer), and of *S. murinus* from 2% (in spring) to 17% (in fall). The respective averages for the four species for all the four seasons were 71%, 15%, 7% and 7% (Table I). The effect of seasons ($F=3.39$; $d.f.=3,18$; $P<.01$) and species ($F=243.05$; $d.f.=3,18$; $P<.01$) on the numbers of specimens in the samples was significant.

DISCUSSION

The small mammals' communities found in the farm houses and the village households of the central Punjab were taxonomically similar, yet the two communities differed with regard to their relative numbers of the species composing them. In

the household communities, *R. rattus* and *M. musculus* were the dominant species which were followed by *S. murinus* and *T. indica*. In the farm house samples, *R. rattus* and *T. indica* were the dominant species which were followed by *S. murinus* and *M. musculus*. The population densities of *R. rattus* and *S. murinus* in the village households and farm houses were comparable as assessed from the trap success data (Table II). But, those of *M. musculus* and *T. indica* were different. The former was more abundant in the households and the latter on the farm houses. Both these species were present in the surrounding farmlands but they and particularly *T. indica* infested the farm houses intensively during the summer season only.

Table II.- Trap success (%) of small mammals in rural households and farm houses of central Punjab.

Seasons	<i>R. rattus</i>	<i>M. musculus</i>	<i>T. indica</i>	<i>S. murinus</i>
Village households				
Summer	10.44	2.59	0.00	0.67
Fall	8.83	0.86	0.38	1.94
Winter	8.62	2.85	0.23	0.39
Spring	8.73	2.55	0.00	0.10
Av.	9.14	2.17	0.16	0.80
Farm houses				
Summer	6.65	1.62	7.54	0.32
Fall	8.67	0.78	2.00	3.00
Winter	10.51	0.52	0.60	0.50
Spring	7.00	0.44	0.00	0.56
Av.	8.05	0.86	2.75	1.00
Combined				
Summer	9.28	2.30	2.30	0.57
Fall	8.79	0.84	0.74	2.17
Winter	9.21	2.12	0.35	0.46
Spring	8.15	2.02	0.00	0.20
Av.	8.85	1.81	0.86	0.86

(Taber *et al.*, 1967). Perhaps because of this reason it is less abundant in relatively isolated and scattered farm houses. Contrary to this, *M. musculus* and *S. murinus* occur both indoors as well as outdoors (Hussain *et al.*, 1975). *T. indica* is found throughout the irrigated canal colonies of the Punjab and in some villages it has been reported to become commensal where, because of its aggressive habit, it is replacing *R. rattus* (Roberts, 1977). But the data of the present study do not suggest any such replacement.

In the households, whether they were located in urban or rural areas (see Ali, 1990 and data of this study), the relative abundance of *R. rattus* was very similar (Table III). In contrast to city households, in the shops and grain markets of cities the relative abundance of the rat was high (Ali, 1990; Khan, 1990; Ahmad *et al.*, 1988). From the rural households and farm houses of central Punjab, four species of small mammals were recorded (Table III). Advani (1984) reported nine species of small mammals from village households of the Indian desert. According to him, during droughts when there was little vegetation in the fields the rodents migrated to human dwellings to feed on stored grains and other food stuffs. In his sample the five-stripped palm squirrel (*Funambulus pennanti*) was also present. This diurnal species was common in the present study area too, but it did not appear in the sample because trapping was not done during the day hours at all. In spite of much greater taxonomic diversity, the village household and godown fauna of the Indian desert was predominated by *R. rattus* which constituted 66% of the trapped sample. Krishnamurthy *et al.* (1967) reported only *R. rattus* and *M. musculus* from a variety of structures in an around Hapur city (U.P., India); the former species being overwhelmingly dominant (Table III).

In farm houses of Joydebpur (Bangladesh), the picture was very different (Table III). Here *M. musculus* co-shared dominance with *S. murinus*. Larger murids like *R. rattus*, *B. bengalensis* and *B. indica* jointly comprised only 12.9% of the total fauna. In Pakistan *B. bengalensis* is present in the farmlands and kitchen gardens of city banglows but it does not occur indoors neither in urban nor in rural areas (Beg and Khan, 1984). But, this rat is known to infest stores and buildings intensively in

Table III.- Species composition of indoor small mammal communities in some Asian countries.

Species	Percent (No. animals)										
	Pakistan							India	Bangladesh		Taiwan
	Rural central Punjab		Faisalabad city			Punjab		Indian desert	Hapur	Joydebpur	Taichung
<i>Funambulus perinanti</i>	-	-	-	-	-	-	-	5.2 (32)	-	-	-
<i>Rattus losea</i>	-	-	-	-	-	-	-	-	-	-	3.8 (5)
<i>Rattus mcltada</i>	-	-	-	-	-	-	-	2.1 (13)	-	-	-
<i>Rattus norvegicus</i>	-	-	-	-	-	-	-	-	-	-	61.8 (81)
<i>Rattus rattus</i>	74 (1060)	63 (354)	75.4 (175)	95.8 (161)	96.5 (218)	94.8 (92)	97.9 (1185)	66.0 (406)	+	5.1 (31)	3.8 (5)
<i>Mus musculus</i>	18 (251)	7 (37)	23.7 (55)	1.2 (2)	3.1 (7)	4.1 (4)	1.7 (21)	4.9 (30)	+	53.4 (326)	28.2 (37)
<i>Golunda ellioti</i>	-	-	-	-	-	-	-	5.7 (35)	-	-	-
<i>Vandeleuria oleracea</i>	-	-	-	-	-	-	-	0.2 (1)	-	-	-
<i>Talera indica</i>	1 (18)	22 (118)	-	-	-	-	-	3.2 (21)	-	-	-
<i>Meriones hurrianæ</i>	-	-	-	-	-	-	-	1.3 (8)	-	-	-
<i>Bendicota bengalensis</i>	-	-	-	-	-	-	-	-	-	7.5 (46)	-
<i>Bendicota indica</i>	-	-	-	-	-	-	-	-	-	0.3 (2)	-
<i>Suncus murinus</i>	7 (93)	8 (43)	0.9 (2)	3.0 (5)	0.4 (1)	1.1 (1)	0.4 (5)	11.2 (69)	-	33.6 (205)	2.2 (3)
Habitat	Village household	Farm houses	Houses	Grain shops	Grocery shops	Sweet shops	Wholesale grain market	Village complex and godowns	Village & town houses, shops	Farmer's households	Store houses
References	This study		Ali (1990)		Khan (1990)		Ahmad <i>et al.</i> (1988)	Advani (1984)	Krishna-murthy <i>et al.</i> (1967)	Mian <i>et al.</i> (1987)	Ku and Lin (1980)

Further east in the Taichung city of Taiwan, *R. norvegicus* shares dominance with *M. musculus* while *R. rattus* is a much rarer species (Ku and Lin, 1990). The changes in species abundance and composition in Taiwan seem to be the result of competition between the rats. The bandicoot rat generally has been described as a field or rural rat (Blanford, 1888-1891; Ellerman, 1941; Prater, 1965). However, since the beginning of the present century an increasingly high percentage of this rat has appeared in samples from larger cities of India and Burma (Rao, 1947; Seal, 1960; Deoras, 1960, 1963; Harrison, 1949). Evidence of this changing pattern

in Calcutta's rodent populations had been noted by Spillett (1968) who reported that *R. rattus* had declined from 14% of the total rodent population in Calcutta in 1906 to less than 1% in 1966, *R. norvegicus* declined from 26% to less than 7%, and *B. bengalensis* increased from 60% to about 98%. According to Seal (1960) and Deoras (1963) proportion of house rats in trapped sample of rodents in Bombay fell from 79% to 17% between 1910 and 1960, whereas the proportion of *B. bengalensis* increased from 1% to 50%. Thus, it may be concluded that numerical superiority of *R. rattus* in the indoor fauna of urban and rural Punjab

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istan) particularly in the former is possibly
ed to the absence of an aggressive competitor
he bandicoot rat.

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