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ECOLOGICAL DISTRIBUTION OF MICE IN THE CULTIVATIONS OF LYALLPUR DISTRICT AND VICINITY.

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A field study aimed at knowing the patterns of distribution of *Mus musculus* and *Mus booduga* in cultivated areas of Lyallpur district and vicinity, was conducted from June, 1973 to August, 1974. *M. musculus* was found to achieve high abundance in such crops as those of pulses, sugarcane and fodder. It also affected human dwellings. *M. booduga*, which affected fewer micro-habitats than *M. musculus*, favoured such crops as those of pulses, wheat, cotton and fodder. This mouse did not infest human dwellings. Neither *M. booduga* nor *M. musculus* existed in wastelands.

INTRODUCTION

The mice of genus *Mus* are serious pests of food grains; they are reported to take a toll of over 20 million tons of world's cereal production (Srivastava, 1968). Such estimates of mice damage are lacking for Pakistan. This paper describes the patterns of distribution of *Mus musculus* Linneaus and *Mus booduga* Gray in the agricultural fields of Lyallpur and neighbouring districts.

MATERIALS AND METHODS

The study period extended from June, 1973 to August, 1974. The area of study comprised agricultural lands falling within a radius of 20 miles of the Lyallpur city, and Jaranwala and Gojra towns (District Lyallpur). Twenty-five traps were set (four times each month) in a straight line; the distance between successive traps being 15 to 20 feet. Different kinds of agricultural fields and wastelands (such as fallowland, saline wastes, and sandy tracts) were trapped for the mice.

Wooden snap-traps (12 cm x 6 cm) baited with oiled bread (roti) were used for capturing the mice. Vegetation/crop of the areas in which trapping was carried out was noted. Total trap-nights, number of animals captured, and the number of traps unset were recorded. Per cent trap success was calculated dividing the number of mice captured by

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the number of total trap-nights and multiplying the quotient by one hundred.

For the statistical analyses Simpson and Roe (1960) were followed.

The study area

Lyallpur District is located in the southern half of the doab between the rivers Chenab and Ravi. Formerly, the entire doab was a scrubland (Rose, 1908). But, canal irrigation, and systematic colonization at the end of the last century rapidly changed the area into a fertile agricultural land. Today, about 87% of the total land area of the district is irrigated (Anon., 1961). Remnants of the scrub vegetation still exist on small alkaline tracts and on uplands that are too high to be irrigated.

Wheat, cotton, maize sugarcane, and fodder are the main crops of the area. Crops sown from October to November and reaped from April to May are called "*rabi*" crops, and others which are sown from June to August and reaped from early September to the end of December are called "*kharif*" crops.

Climate

The climate of Lyallpur district is characterized by extremely hot and dry summer alternating with severe winter. In June, temperature frequently exceeds 110°F. December and January are the coldest months when the night temperature often falls below freezing point. Most of the rainfall occurs during the monsoon (July-August). In addition, there is usually rain during the "little monsoon" of January and February. The yearly average is 12.58 inches.

RESULTS AND DISCUSSION

Table 1 shows distribution of *Mus musculus* and *Mus booduga* in different types of crops and wastelands. In this table trap success for the *rabi* and *kharif* crops has been considered separately. Trap success in sugarcane fields, human dwellings, and wastelands have also been considered separately according to the two cropping periods.

Mus musculus

During the *rabi* period the trap success for *M. musculus* in different types of crops and habitats varied from 2.08 to 19.23%. Leguminous crops,

particularly pulses, were the most favoured ones. Second highest abundance was observed in human dwellings. Abundance of these mice in the standing crops of wheat, mustard and sugarcane was roughly of the same order (Table 1). Trap success in recently harvested fields of wheat and pulses was very low. This indicated that soon after the crops were harvested mice populations declined. No specimen of *M. musculus* was captured from vegetable plots and wastelands.

During the *kharif* period trap success varied from 4.42 to 14.23%. Trap success in sugarcane, cotton, and fodder crops was the greatest. Trap success in maize, oilseed crops, vegetables, and human dwellings was relatively small. No mouse was captured from wastelands. This seems to support Schwarz and Schwarz (1943) who reported that outdoor populations of *M. musculus* existed only as commensals of man.

The average trap success for the entire period of *rabi* was 4.35%, whereas the average trap success for *khairf* was 8.48% (Table 1). Thus, the trap success during *kharif* period was approximately double the rabi period. This difference in trap success seems to be related to different rates of recruitment during the two periods. It has been reported that the rate of pregnancy in *M. musculus* was lower in the fall and high in the summer (Rana, 1975). As *kharif* period extends from the early spring to the mid-fall, the higher trap success observed in this period may be attributed to the higher rate of reproduction and recruitment.

However, the observed decline in the field population of the mice during *rabi* could have been due to emigration and death. The Australian populations of *M. musculus* have been reported to abandon wheat fields as the environmental conditions deteriorated in winter and took refuge in reed-beds. From the reed-beds the mouse reinvaded the fields in spring and summer (Newsome, 1969a, b) As the trap success of *M. musculus* in human dwellings in *rabi* was 9.52% as compared to 4.96% in *kharif*, it seems that some of the mice migrated to human dwellings perhaps to avoid the winter cold.

Mus booduga

During the *rabi* period *Mus booduga* was found restricted to only four types of crops namely, wheat, pulses, mustard, and vegetables. No specimen of this mouse could be obtained from sugarcane, harvested fields, human dwellings, and wastelands (Table 1). Pulses were the most favoured crops. Next in order of preferance were wheat, mustard, and vegetables. The average trap success for the *rabi* period was 2.37%.

TABLE 1. *Relative abundance (as determined by trap success) of Mus musculus and Mus booduga in the croplands and wastelands of Lyallpur district and vicinity.*

Habitat	Total trap nights	*Mus musculus*			*Mus booduga*	
		Traps unset	Animal captured	Trap success %	Animal captured	Trap success %
Rabi Period						
1. Wheat	87	14	4	4.60	7	8.05
2. Pulses	26	3	5	19.23	3	11.54
3. Mustard	23	2	1	4.35	1	4.35
4. Vegetables	46	12	—	—	1	2.17
5. Harvested fields	48	11	1	2.08	—	—
6. Human dwellings	21	—	2	9.52	—	—
7. Sugarcane	218	13	9	4.13	—	—
8. Wasteland	37	—	—	—	—	—
Total	506	55	22	4.35	12	2.37
Kharif Period						
1. Cotton	38	3	4	10.53	5	13.16
2. Maize	21	3	1	4.76	—	—
3. Fodder	11	—	1	9.09	1	9.09
4. Oilseed crops	134	28	6	4.47	10	7.46
5. Vegetables	37	8	2	5.41	1	2.71
6. Human dwellings	68	15	3	4.81	—	—
7. Sugarcane	260	70	37	14.23	12	4.61
8. Wasteland	68	13	—	—	—	—
Total	637	140	54	8.48	29	4.57

During *kharif M. booduga* affected five crop types, namely, cotton, fodder, oilseed crops, vegetables, and sugarcane. Cotton was the most favoured *kharif* crop. Next in order of preference were fodder, oilseed crops, sugarcane and vegetables. The average trap success for *kharif* was 4.57% i.e., twice as large as that for the *rabi* period. This seems to be related to

reproduction and recruitment. Like *M. musculus*, the rate of recruitment in *M. booduga* in *kharif* was greater than in *rabi* (Rana, 1975).

Difference in Distribution

The average trap success of *M. musculus* appears to be greater, both in *rabi* and *kharif*, than that of *M. booduga*. However, statistical tests revealed that the difference in the trap success of the two species was non-significant in *rabi* and significant in *kharif*. *M. musculus* was more abundant than *M. booduga*.

Table 1 shows that *M. musculus* had a wider ecological niche than *M. baoduga;* the former affected a larger variety of micro-habitats. Thus, the two mice had somewhat different spatial distribution. Furthermore, they achieved different levels of abundance in micro-habitats of co-occurrence. Thus, their ecological niches, were at least, partially segregated and this enabled them to co-exist in the same area. Absence of *M. booduga* from human dwellings was notable; it has been reported to affect human dwellings (Prater, 1971; Srivastva, 1968). Perhaps, *M. musculus* is more successful in human dwellings than *M. booduga*. It is quite possible that in those localities where *M. musculs* does not exist *M. booduga* might affect the human dwellings. Thus, absence of *M. booduga* from the human dwellings might be a result of competitive exclusion. Such exclusions have been observed between *Bandicoota bengalensis* and *Rattus rattus* and in several other species of mammals (DeLong, 1966; Lidicker, 1966; Spillett, 1968).

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