Pak. J. Agri. Sci., Vol 20 (3-4), 1983

PATTERN OF INFESTATION OF WHEAT CROP BY RATS AND MICE

Mirza, A. Beg*, A. A. Khan* and M. Sarwar**

ABSTRACT

A standing wheat crop on an irrigated farmland near Faisalabad city was snap-trapped in 1980-81 for its rodent fauna. Bandicoot rat, Indian gerbille, soft-furred field rat, and house mouse were found to be the dominant wheat species. The Indian gerbille, and the house mouse affected the wheatlands from the sowing till the harvesting time. The bandicoot rat and the soft-furred field rat joined these animals when the crop was in the booting stage. The former species attained absolute numerical dominance during the maturation phase. It was then that the rodents were at the peak of their abundance. Past this peak, their populations began declinig and within a month of the harvesting operation they apparently deserted the wheat fields.

INTRODUCTION

In the croplands of that portion of the Indus Valley for which the rivers Ravi and Chenab form the principal boundaries, the bandicoot rat (*Bandicota bengalensis*), the short-tailed mole rat (*Nesokia indica*), the Indian gerbille (*Tatera indica*), the soft furred field rat (*Rattus meltada*), and the house mouse (*Mus musculus*) are the chief depredators of the farm crops. They obtrusively parcel out a significant part of the food energy fixed in the crop plants into their own populations. This paper describes the pattern of infestation of the wheat crop by these murids and as such lays a basis for developing an intelligent programme for inh biting their depredations in the wheatlands.

MATERIAL AND METHODS

An area of 62.5 acres of canal irrigated farmland near village Nurpur, about 6.4 km north east of Faisalabad city, was selected for this study. The periodic recording of the acreage of various farm crops and subhabitats of this

* Department of Zoology and Fisheries, University of Agriculture, Faisalabad.
** Government Jinnah Islamia College, Sialkot.

study block coincided with the important growth stages of the wheat crop. The study block comprised of about 36 acres of wheat fields. Of these, ten acres were randomly chosen for snap-trapping for two to three nights during sowing-seedling, tillering, booting, maturation, ripening pre-harvesting and post harvesting phases. The snap-traps used were metallic rat (17 cm × 9 cm) and wooden mouse (12 cm × 6 cm) traps. The bait comprized of "roti" pasted with "ghee". Each of the fields chosen for the sampling was served with three traps stations and at each station three traps (two rat traps and one mouse trap) were set within a raduis of two meters. The station were so located that they sampled both the peripheral and central parts of fields with almost equal intensity. The traps were set at dusk, checked the next dawn and set again in the evening. Trap sucess $\left(\frac{\text{number of animals captured}}{\text{number of trap nights}} \times 100\right)$ was used as an index of the population density.

Wheat, sugarcane, and fodder were the main crops, whereas *Brassica*, tomato etc. constituted the minor crops of the study block. At the time of sowing of wheat in November about 8% of the total land area of the study block was under the cane crop. Following the harversting operation, the cane's area continually declined and by the time the wheat crop began to be harvested it was merely 0.2% of the whole land area. The fooder crops occupied 17%, minor crops 4% to 9%, ploughed and fallow lands 12% to 23% of the total land area of the study block.

RESULTS

Table 1 documents information about the change in the relative densities of the rats and mice populations affecting the wheat crop in different growth stages. The build-up in these populations in the earlier stages resulted in a peak in the maturation stage. Past this peak, the populations continually declined and after about a month of the harvesting operation no animal was trapped (Fig. 1). These variations in the population density of the rodents in different growth stages were statistically significant (X^2 (proportion method) = 324.38; d.f. = 6; $p < .001$).

Table 1. *Relative density (=trap success) of rodent populations affecting wheat fields near Faisalabad city*

Growth stage	Sampling dates	Trap nights	Animals captured	Rel. density (%)
Sowing-seedling	Nov. 26-27, 1980	189	13	7.2
Tillering	Jan. 1-3, 1981	270	13	4.8
Booting	Feb. 15-16, 1981	180	28	15.6
Maturation	Mar. 8-9, 1981	180	47	26.1
Ripening	Mar. 25-27, 1981	270	42	15.6
Pre-harvesting	Apr. 14-15, 1981	180	13	7.2
Post-harvesting	May 29-30, 1981	180	–	–
		Total : 1440	156	10.9

In the sample obtained during the sowing-seedling period only the Indian gerbille, house mouse, and house shrew (and insectivore) were represented in the sample with 5.0%, 1.7% and 0.6% relative densities (Fig.1). In the tillering stage only the Indian gerbille and house mouse were captured; the respective densities being 0.7% and 4.1%.

During the booting period, Indian gerbille, bandicoot rat, house mouse, soft-furred field rat, and the house shrew were represented with 8.9%, 3.3%, 1.1%, and 0.6% relative densities. During the maturation phase the species composition of the trapped sample remained unchanged but their relative densities generallay improved; the respective densities being 5.6%, 13.3%, 4.7%, 2.2% and 1.1%.

During the ripening phase, the overall density declined but two additional species viz., the short-tailed mole rat and bush rat (*Golunda ellioti*) appeared in the sample for the first time. Thus, seven species of small mammals were represented in this sample. The relative densities of the Indian gerbille, bandicoot rat, and house mouse were 3.3%, 6.7% and 4.1%, and 0.4% for each of the remaining four species. In the sample taken just before harvesting only four species, namely, the Indian gerbille, the bandikoot rat, the house mouse,

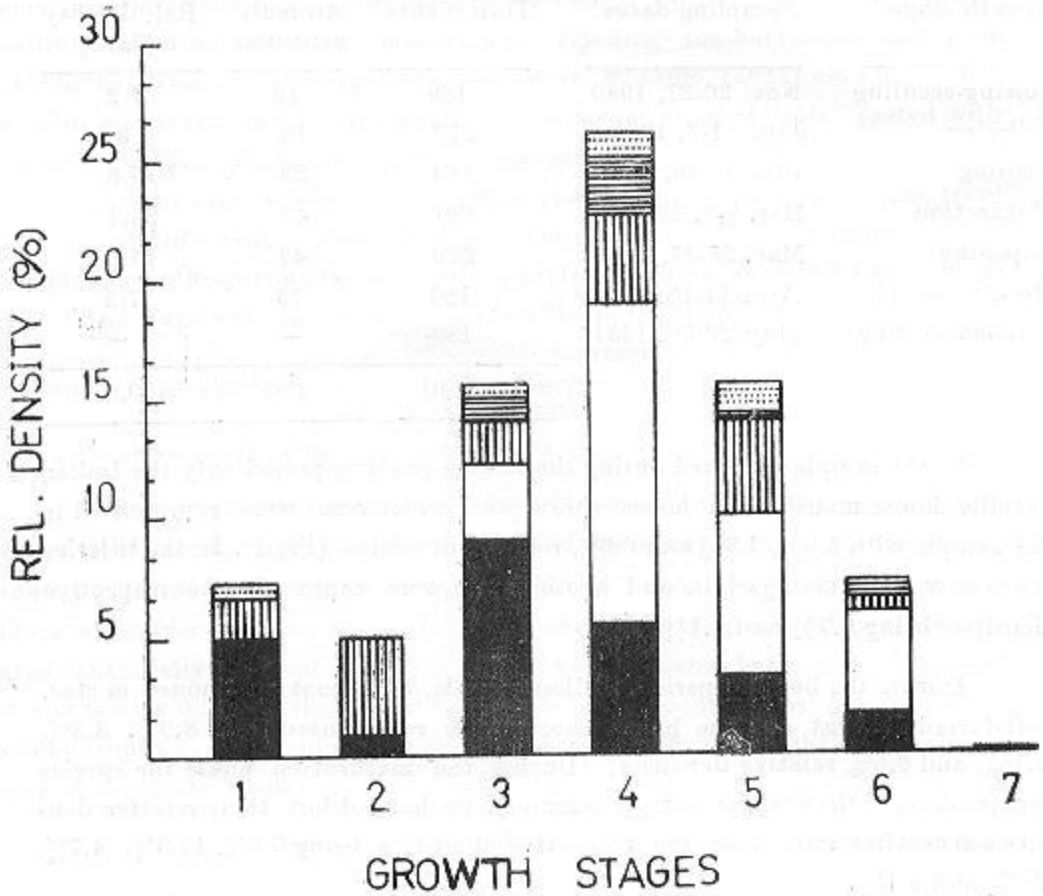

Fig. 1. Relative density of *B. bengalensis* (blank), *T. indica* (black), *R. meltada* (horizontal bars), *M. musculus* (vertical bars), and some other small mammals found in the sowing-seedling (1), tillering (2), booting (3), maturation (4), ripening (5), Preharvesting (6), and postharvesting (7) phases of the wheat crop.

and the soft-furred field rat were represented with 1.7,% 4.4%, 0.6% and 0.6% relative densities. In the post-harvest sample, which was taken towards the end of May, no specimen was present.

Thus, the indian gerbille and the house mouse apparently foraged in the wheat fields from sowing till harvesting of the crop. These animals dominated the wheat fauna till the booting stage. In this stage, the soft-furred field rat and the bandicoot rat joined them. The bandicoot rat attained absolute numerical dominance during the maturation stage. It was then that the rodents were at the peak of their abundance. Past this peak, their populations began declining and within a month of the harvesting operation no rodent could be recorded from the wheet fields.

DISCUSSION

The observed demographic changes in the rodent fauna of the wheat fields must have been related to migration, natality or mortality. Beg *et al.* (1980) have indicated that the bandicoot rat, the soft furred field rat, and the house mouse colonized the wheat fields after dispersing from the fall-winter assembl-agss in the sugarcane fields, while the Indian gerbille arrived from alkaline or sandy wastes. The soft-furred field rat and the bandicoot rat and particularly the latter would not leave the cane crop till sufficient cover was available in the wheat fields (Mufti, 1983). The time of migration of these two animals to the wheat crop roughly coincided with the population peak observed in March. As recruitment of the young, to the three rat populations, did normally not begin till late March (Khan, 1982), the build-up in these populations was obviously due to immigration. Further, the post-peak decline was, in all probabil-ty, a result of emigration and not due to mortalities.

As the four species of the rodents have different schedules of exploiting the resources of the wheat crop, control operations against them must be repeat-ed, at least, twice-once during the sowing-tillering stage and next during the booting stage, to ensure sufficient crop protection. Preferably, these pests must be destroyed before they get a chance to disperse over a vast and nutri-tively rich area of the wheat crop. This can be achisved by killing the bandicoot rat, the soft-furred field rat, and the house mouse in the cane fields and the Indian gerbille in the nearby sandy or alkaline tracts.

REFERENCES

Beg, M.A., M. Yaseen, and S.A. Rana. 1980. Pattern of rodent abundance ih field crops near Faisalabad. Pak. J. Zool. 12 : 183-187.

Khan, A.A. 1982. Biology and ecology of some rodent pests of agriculture in central Punjab. Ph. D. Thesis, Dept. Zool., Univ. Agri., Faisalabad.

Mufti, M.S. 1983. Abundance and inhibition of rodent populations in sugarcane. M.Sc. Thesis, Dept. Zool., Univ. Agri., Faisalabad.