CHAPTER III
STATEMENT OF PROBLEM

The twentieth century has witnessed scientific growth which is unparalleled in the history of mankind. The human brain has toiled ceaselessly and scientific endeavours have achieved stupendous success. The ultimate purpose of all scientific research is to aid mankind. Man has been the focus of scientific research. Every sphere of human activity has attracted attention. Never before have scientists the world over, worked so zealously towards a common cause, the betterment of mankind. Scientists strive to make this world a safer and better place for humans.

The giant strides in technology have led to massive increase in agriculture production. In spite of this, paucity of food is a major concern of the world. Many governments have been unable to provide one square meal a day of its citizen. Protecting man from various health hazards has been the prime concern of scientists. No doubt plague is the most lethal of all rodent inspired diseases but there are others which are also harmful. India has over the years struggled to produce sufficient food for its people. Malnutrition or lack of nutrition continue to pose a major threat. In such a situation every grain saved is a step towards progress. Rodents drain away the already meagre food resources. There is notable contrast with the locust, whose terrifying swarms
have been subjected to large scale and often successful research. Yet, rodents, who by their numbers, omnipresence and incessant activity have greater effect on food supplies, have not drawn the same attention. The knowledge on commensal rats is limited and demands greater attention.

Research on the species of the genus Rattus, commensal with man, are noteworthy in many ways. The material about its feeding rates, feeding behaviour, fixing of habit rhythms and reactions to poisons is inextricably linked with the theory and practice of rat control. Of late it has increasingly attracted the attention of many workers, as is clearly evident from the literature incorporated in modern works of rodents in India (Barnett and Prakash, 1975).

The variability of food habits of these species are a major concern to mammologists and pest control operators. Thus, interest in such factors regulating food selection and preference is evident. To avoid scrupulous development of resistance to baits and poisons, more insight to different component behaviours and to other aspects in relation to their control has to be given. It is therefore, necessary to find the alternative methods for an effective control. Little has been achieved on the lines of such components of practical importance, though excellent work on it has appeared from elsewhere (Cowan and Barnett, 1975). Realising the gaps as
they exist in study of these species in India, food preferences and bait-shy behaviour have been mainly studied.

There is a close relationship between studies of food preferences and control measures. Poisoned baits have to be eaten by rats in sufficient quantity, in order to be lethal. To make them eat enough of it, not only efficient baiting procedures but attractive foods are also required. These are vehicles of poison, which determine the results. Rattus mellitea, is a serious pest of food crops; losses due to it though never satisfactorily assessed, are perhaps considerable. Information needed to formulate attractive "bait-bases" are generally lacking, various aspects of feeding of this species have not been sufficiently studied. In the present study, the author has endeavoured to conduct a large enquiry into its feeding behaviour. The main aim of the present investigation is to find out the basis of their food selections so as to formulate an ideal bait-base for their control.

As the ecology of Rattus spp., has greatly been studied in different environments of various states. Its control is now receiving more attention. It is apparent from the literature that studies are being carried out by adapting various techniques, by trying modern and new rodenticides and by comparing the efficacies of different bait compositions and rodenticidal activities. The rodenticides have dominated in
the field of rodent control for quite some time, but development of resistance by rats has led to a search of new methods. Very little has been achieved on the lines of bait-shyness and taste aversion learning for practical use and obviously for an effective control. These are the two basic components of behaviour which prevent rats from eating toxic food. Therefore, the present research is an attempt to enquire into such applied aspects of behaviour of roof rats, *Rattus rattus*. Studies were mainly concentrated on the oral administration of the poisons. Their responses to various olfactory and gustatory stimuli by the effect of attractive and repellent odours and tastes have also been subjected to close scrutiny.

In view of the various limiting factors for a wider application of any control method, bait-shyness of every species has to be studied to promote the palatability of an effective bait, thereby enhancing the potency of rodenticides. The phenomenon of bait-shyness is well established and has a great survival value, though it is at the same time disadvantageous from an applied point of view. Thus, bait-shyness studies merit special attention and keeping in view of the paucity of literature on the experimental bait-shy behaviour, the present work deals in detail with this.
Alternative methods for mitigating if not eliminating shyness have to be discovered. To mitigate shyness, an experiment to measure responses of rats to the same baits after poisoning was successfully carried out. Use of oily cereal mixtures were found to retard shyness in one respect, and it was not broadened to cereal mixtures or its components after poisoning in corresponding mixtures containing oil.

Trapping is an effective way to reduce rats in certain situations. It is specially effective as a follow up action after use of other control measures. During the course of live trapping, the present investigator came across an anomaly. The eyes of a sizable percentage of trapped rats were found to be opaque. Detailed examinations revealed that they were suffering from cataract, a deficiency disease and it probably occurred due to scarcity of food in the thickly populated colonies. An experiment was designed to study the responses of roof rats to wonder trap in an enclosed set up. The individual reactions of rats to trap-shyness and trap-habit was followed and thoroughly discussed in one of the chapters.

Conclusions of all chapters are given briefly in the abstract. Materials and methods, introduction, results and
discussions of different chapters are mentioned separately.

It is hoped that whatever has been accomplished by the present investigator would stimulate further research work in devising baiting schemes, or design baits which helps to eliminate shyness developed by rats. It must be borne in mind that such work should be cost operative and effective in the field.