Bats are extraordinary and varied creatures. They are the only flying mammals and apart from birds they are the only vertebrate capable of sustained flight. Among mammals, chiropterans (bats) are undoubtedly the most gregarious and successful group of beneficial animals to the ecosystem and have lured the attention of ethologists. The role of bats in the affairs of man and his environment is of paramount importance because their persistence is a must for the maintenance of a balanced ecosystem. Their diversity is shown by their appearance, their dietary habits, social organization and their choice of place to roost. A great deal about the population, reproduction and feeding is needed for their conservation measures.

*Hipposideros ater* a microchiropteran bat is an active biocontrolling agent in both the urban and agro-ecosystem. A brief survey on the distribution of *H. ater* in and around Tirunelveli, South India was recorded during 2001-2004. Their roost selection is mainly dark and humid chambers of unused anthropogenic buildings. Their colony size ranges from a pair to hundreds. The members of the colony maintained inter-individual space. They showed bimodal reproductive cycle correlating with the monsoon of the study area. The colony also permits the coexistence of *H. speoris* and *M. lyra*.
A continuous monitoring revealed that the colony of *H.ater* is highly sensitive and showed high fluctuation with sharp decline due to human intruders and habitat destruction particularly during their breeding seasons. This highly disturbs and subjects them for irreparable stress.

There is a strict sexual segregation during non breeding seasons between copulation and parturition. During this gestation period the female members form maternity colony with pups and sub-adult males which existed from late October to December and early April to June.

At the time of birth, sex ratio was 1:1 but there was a preferential mortality of male pups (50%) during the prevolant and volant period which had led to female dominated sex ratio in the adult population. Another reason for this deviated 1:1 sex ratio in adult is high roost fidelity of female members and sexual segregation of male bats during the non breeding period.

The colony of *H.ater* also showed a lower cumulative birth rate to the corresponding cumulative death rate during the course of investigation. In the *H.ater* colony of the study area, the female attained sexual maturity and become pregnant in 7-8 months of age with a gestation period of 80-90 days. Repeated tagging studies showed *H.ater* is also able to give birth twice in a year but never twins.

Chemical communications have a variety of functions to carry out in the world of animals. Bats use a combination of visual, auditory, tactile and olfactory cues as their system of communication. As they are nocturnal, the auditory and olfactory cues become a prime mode of communication. A species
specific variation in 'bat-odour' is produced by urine, saliva and integumentary specialised glandular secretions. The pungent and unpleasant smell is mainly due to esters, nitrogen containing compounds and lipid derivatives of their olfactory signals. GC-MS analysis of urine, saliva and integumentary secretions of anal, neck, ear, dorsal and abdomen region indicates the presence of compounds with alcohol, aldehyde, ketone, ester and fatty acid derivatives as their functional group. They serve as sex attractant during mating. In the females they perform a role of olfactory signal in pup-recognition.

Decanoic acid in the saliva and 1,3-Epoxy-4-methylpentane in the ear were used as sex attractant between breeding pairs. Similarly *H.ater* uses decanoic acid, 3-Methyl heptylacetate, Methyl-2-hydroxy dodeconate of urine and saliva as territory markers.

The mothers of *H.ater* mainly use pyrrolidine, 5-Methyl-2-heptamine to mark their pups. Along with these compounds 2-Propylamine of the maternity colony produces a fishy odour.

During breeding season the potent male members showed a series of sexual behaviour like self-grooming, self anointing with secretions, marking, sniffing, rubbing and dragging to select the mating partner. The body rubbing behaviour may be the reason for both partners to have similar sex attractants in different parts of the body during breeding season.

Artificial synthesis of sex attractant analogues and their deciphering will add a new page in species specific conservation of these bats.
in their roosts as well as in bat houses, as these olfactory cues to bring reproductive success and enable the continuation of race in the ecosystem.

The meticulous care of young in bats is a combination of long term of lactation and strong sense of olfaction. The nuzzling, sniffing, rubbing, self-grooming, fanning and licking are some noticed behaviours in bats to prove that they secrete and mark by odoriferous compounds. These olfactory cues in turn bring reproductive success and enable the continuation of race in the ecosystem.

Generally *H. ater* is selective but opportunistic in feeding and mainly hunts pests of storage godowns in the urban and pest in the agro-ecosystems. The common pests that fall in the feeding spectrum of *H. ater* belong to insect orders like Coleoptera, Lepidoptera, Diptera, Hemiptera, Hymenoptera, Trichoptera, Neuroptera and Dermoptera. The faecal analysis and culled parts collected from the roost is a thumb proof for their pest monitoring capacity over a variety of pests of store houses, ornamental plants and agro-ecosystem.

*H. ater* consumed from Coleoptera, Lepidoptera, Diptera and Hemiptera as their major and constant dietary preference. Among the coleopterans insects, the *Tribolium sp.* of beetles represent 55.38% of total consumption which is the major pest of storage godown located very close to the roosting site of *H. ater*. During winter months *H. ater* hunts on lepidopteran pests whose caterpillars are the major pests of agriculture. Mosquito eradication by *H. ater* is also high during the month of November and
December is noticeable. Mosquitoes constitute 98.33% of the dipteran prey items. As *H.ater* scoops on both the sexes of mosquitoes at their swarm they keep a check on mosquito population.

Their highly cambered wing and their entire shape of wings enable *H.ater* aerodynamically to achieve flight within vegetation and close to the ground. They can also perform stereotypic circling flight which helps in insect hawking near vegetation. These bats are adapted with shortened jaws which aid in powerful hunting. Their dental arrangement in upper and lower jaw is suitable for crushing the food. The differentiation in teeth and mandibular joints helps to close the mouth quickly and easily which prevent the escape of food.

The conclusion drawn from the study clearly explains that in spite of their bimodal reproductive cycle, long term maternal care and good sense of communication systems, there is a decline in the population of *H.ater*. The stress for the survival of these sensitive beneficial animals in the ecosystem is mainly due to threats in their roosting habitat. The roost is the place for social communication in bats and a site for rearing the young ones. Disturbance to roosts is the main factor that pulls down the reproductive success. To maintain a sustainable ecosystem in and around Tirunelveli both in urban and agro-ecosystems these bio-control agents demand a species specific conservation measure to protect their roosts by means of Government legislation.
During the formulation of legislation with out giving importance to false economic principles and political salvation, the Government authorities must consider the genuine scientific information from active field biologists to protect the natural key roosts of these sensitive bio-control agents. Government should also encourage the construction of bat houses in agro and urban ecosystem and the usage of sex attractant analogue in the roosts.