

# SPECIES RICHNESS OF INSECTIVOROUS BATS IN SELECTED TEA PLANTATIONS IN SRI LANKA: A PRELIMINARY STUDY

Tharaka Kusuminda<sup>1\*</sup>, A.P.M.K. Karunaratna<sup>2</sup>, Amani Mannakkara<sup>1</sup> & Wipula B. Yapa<sup>3</sup>

Department of Agricultural Biology, Faculty of Agriculture, University of Ruhuna, Kamburupitiya, Sri Lanka<sup>1</sup>. Sandaraja Wana Arana, Dothalu-oya, Dolosbage, Sri Lanka<sup>2</sup>, Department of Zoology, Faculty of Science, University of Colombo, Colombo 03, Sri Lanka<sup>3</sup>.

Corresponding author\*: [t.kusuminda@gmail.com](mailto:t.kusuminda@gmail.com)

## Introduction

Tea has been the country's principal and most famous export; for generations, it formed the backbone of the Sri Lankan economy, and plays a major part, even today, in the country's fortunes. The tea estates of Sri Lanka exist in 14 Districts in Up-Country, Mid-Country and Low-Country in Sri Lanka (Sri Lanka Tea Board, 2011). Recent changes in cultural practices in tea plantations in Sri Lanka have increased yields but have intensified pest problems. Total of 46 species of insects and five species of mites have been identified as tea pests. These could be classified as key, seasonal, potential and occasional pests. To defend the tea crop against pests, a large number of chemical insecticides have been used in tea from time to time. However, the alarming rise in resistance to chemical pesticides, together with growing concern for their environmental impact, has led to renewed interest in biological control as often an inexpensive and safe component of integrated pest management (Vitarana, 2003).

Using natural enemies to suppress pest populations, known as biological control agents, include predators, parasitoids, and pathogens. At the turn of the last century large scale biological control programs have been initiated and now become a very effective and widely used method of controlling pests. Insectivorous bats are considered as the major predators of nocturnal areal insects. They consume a variety of insects, move in a large spatial area, and very high in numbers, that has the potential to act as very effective biological pest control agents in agricultural lands (Yapa, 2012). In our study we wish to firstly investigate community composition of bats in selected tea plantations. Secondly, we wish to establish baseline data on the diet of different bat species resident in the area, with a view to identify insect families, genera and species, which are consumed by these bats. Providing our findings will indicate that bats in fact play a major role in pest control inside tea estates. Then we wish to increase the presence of bats within selected tea plantations, providing suitable roosting sites (such as bat boxes), to augment the pest control capacity by bats in tea plantations.

## Objectives

The objective of the present study was to ascertain the potential role played by bats in pest control in tea plantations. As a part of this study, we are focusing on the species richness in selected six tea estates representing all tea growing regions to assess their species diversity finally.

## Methodology

Six tea estates corresponding to major tea growing regions in Sri Lanka were selected as follows. Small holder tea land at Thawalama (Wet zone low-country), tea estate at Idulgashenna (Intermediate zone up-country), tea estate at Udupussellawa (Intermediate zone up-country), tea estate at Radella (Wet zone up-country), tea estate at Yatideriya (Wet zone mid-country) and tea estate at Maskeliya (Wet zone up-country). All sites will be sampled once in three months for one year period (four phases) to cover all seasonal bat activities. Bat roosting sites vicinity to the selected tea estates also observed.

Capturing of bats within the tea plantations was done using Triple High Forest Filter Mist Net Set and G7 Forest Strainer Harp Trap. Mist net was opened in two times of each night (after sunset and before sunrise) and it is kept under continuous observation. Harp trap was placed on usual flyways of bats after prior observations and left open for all night and monitored at regular intervals. In addition to the above methods, bat roosting sites in tea plantations will also be studied. Capturing of bats was done under research permit (No: WL/3/2/02/2016) of Department of Wildlife Conservation of Sri Lanka (DWLC). All captured bats were immediately weighed and key morphometric measurements were taken using Pesola spring scale and digital vernier calipers respectively. Photographs of key morphological characters were taken using Canon EOS 70D digital SLR camera fitted with Canon EF100mm f/2.8L IS USM macro lens for confirm identification. GPS

coordinates of all sampling sites were recorded using Garmin etrex 20x hand held GPS receiver. Species identification was confirmed using regional bat keys and handbooks.

## Results & Discussion

### Species Richness

First phase of the field works was conducted in September 2016 and the data gathered from that field works was used to prepare this publication. Six species of insectivorous bats from three families (Rhinolophidae, Hipposideridae and Vespertilionidae) were recorded from roosting sites in and closely located to the tea lands. Of the total recorded species, only two species of bats were caught by trapping gears while they were foraging inside tea lands (Table 1). According to the current results, *Rhinolophus rouxii* is the frequently recorded bat from sampling sites.

Table 1. Species of bats recorded from roosting sites and inside tea lands.

Region	Sampling site	Captured species inside tea land	Captured species from nearby roosting site
Wet zone low country	Thawalama	<i>Rhinolophus rouxii</i>	<i>Rhinolophus rouxii</i> , <i>Rhinolophus beddomei</i>
Intermediate zone up country	Idulgashenna	<i>Rhinolophus rouxii</i>	<i>Miniopterus fuliginosus</i>
Intermediate zone up country	Udupussellawa	-	<i>Rhinolophus rouxii</i>
Wet zone up country	Radella	<i>Pipistrellus ceylonicus</i>	<i>Pipistrellus ceylonicus</i>
Wet zone up country	Maskeliya	<i>Pipistrellus ceylonicus</i>	<i>Pipistrellus ceylonicus</i>
Wet zone mid country	Yatideriya	<i>Rhinolophus rouxii</i>	<i>Rhinolophus rouxii</i> <i>Hipposideros lankadiva</i> <i>Hipposideros speoris</i>

According to the Wordley *et al.*, (2015) seven bat species from ten studied bats (*Hesperoptenus tickelli*, *Miniopterus fuliginosus*, *Miniopterus pusillus*, *Myotis horsfieldii*, *Pipistrellus ceylonicus*, *Megaderma spasma*, *Hipposideros pomona*, *Rhinolophus beddomei*, *Rhinolophus indorouxii* and *Rhinolophus lepidus*) in tea dominated landscape were recorded in tea plantations of Western Ghats of India. In their study *Megaderma spasma* and *Rhinolophus beddomei* were never recorded in tea plantations. According to their results, most bat species showed positive responses to Coffee plantations and forest fragments than tea plantations. However, we observed that, high bat activity and different kind of bat species were foraging inside all sampling sites. By conducting more field works and changing the location of trapping gear establishment, we hope to obtain more results during next three phases.

In addition to the above species, two Mega-chiropteran bats were caught in to mist nets inside the tea estates. One *Pteropus giganteus* was caught in the Udupussellawa and one *Rousettus leschenaultii* was caught in the Radella site.

### Roosting sites

Two roosting sites locating near to the tea land at Thawalama were observed. Both are abandoned plumbago mines and one is comparatively larger than the other one. *Rhinolophus rouxii* and *Rhinolophus beddomei* were observed in large and small mine respectively representing about 100 individuals at large mine while observing five in small mine.

An ancient tunnel was found below the Idulgashenna railway station and entrance of the tunnel is existing inside the tea estate. Near to the entrance of the tunnel, around 50 individuals of *Miniopterus fuliginosus* were observed.

At Udupussellawa one bat roosting site observed close to a tea estate and it was an ancient tunnel too. This tunnel is home to a big population of *Rhinolophus rouxii*.

Around 15 individuals of *Pipistrellus ceylonicus* colony was observed in hollows of two *Albizia* sp. trees locating in the tea estate at Radella beside the Hatton-Nuwara Eliya main road.

A *Pipistrellus ceylonicus* colony around 30 individuals is roosting inside the ceiling of estate manager's office building in a tea estate at Maskeliya were observed.

Two rock cave located at the boarder of the tea estate at Yatideriya inhabits by colonies of *Rhinolophus rouxii*, *Hipposideros lankadiva* and *Hipposideros speoris*.

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