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Three sympatric land snail species in an isolated islet of Rathgama Lagoon ecosystem of Sri Lanka

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ABSTRACT. The total number of land snails reported in Sri Lanka present may be close to 300 distinct species and there could be broadly grouped; endemic species, non-endemic native species and exotic species. *Acavus haemastoma* and *A. superbus* are endemic species commonly found in the natural forests and home gardens that are in close proximity to natural forest and have dense canopy of large trees and a well developed layer of shrubs and saplings. *Cryptozona bistrialis* is another non-endemic native land snail found in the forests of the dry and intermediate zones, but in the wet zone it is restricted to cultivated habitats below the elevation of 1000 m. This study mainly was based on the population dynamics of above mentioned three sympatric land snail species in an isolated islet of Rathgama lagoon ecosystem in Gall District, Sri Lanka comparing two distinct habitats. These species were found showing considerable differences in their respective abundance with regards to the different habitat. Further investigations are necessary on the population dynamics and their associations of these snails in this isolated narrow ecosystem.

Introduction

In Sri Lanka, the total number of land snails present in the country may be close to 300 distinct species and they fall into three broad groups: endemic species, non-endemic native species and exotic species [Raheem, Naggs, 2006]. Approximately 80% of the land snails are endemic whereas genera such as *Acavus*, *Aulopoma*, *Oligospira*, *Ravana* and *Ratnadvipia* were reported as endemic [Raheem, Naggs, 2006; Raheem et al. 2000].

Acavus haemastoma (Linnaeus, 1758) and *A. superbus* Pfeiffer 1850 are endemic species that may occur at high densities in natural forests and home gardens that are in proximity to natural forests and have the trees with dense canopy and a well developed layer of shrubs and saplings [Raheem, Naggs, 2006]. *Cryptozona bistrialis* (Beck, 1837) is a non-endemic native land snail occuring across the forests of the dry and intermediate zones, but in the wet zone it is restricted to cultivated habitats below the elevation of 1000 m [Raheem and Naggs, 2006]. The diversity and abundance of exotic land snails are greatest in non-forest and cultivated habitats such as village and urban home gardens, commercial plantations and croplands [Raheem, Naggs, 2006]. Exotic snails and slugs are reported to be as pests for native biodiversity which is a serious and growing problem in Sri Lanka [Naggs, Raheem, 1990, 2002; Raheem, Naggs, 2006].

The loss and fragmentation of natural forest is a potential threat to land snail fauna of Sri Lanka [Raheem, Naggs, 2006]. Information on habitats, food habits, predation, population dynamics and distribution of Sri Lankan land snail fauna is scarce except few studies [Karunarathna, Amarasinghe, 2009; Naggs, Raheem, 1990, 2002; Priyadarshana, 1998, 2000, 2001; Raheem, Naggs, 2006; Raheem et al . 2000; Ratnapala, 1984]. This study was mainly based on the population dynamics of three sympatric land snail species namely *Acavus haemastoma*, *A. superbus* and *Cryptozona bistrialis* in an isolated islet of Rathgama lagoon ecosystem in Gall District, Sri Lanka.

Materials and Methods

The observations were made by the naked eye. The study was done from June 18th to 20th 2007 in Rathgama lagoon in Sri Lanka. The air temperature was measured by using a digital thermometer and the humidity taken using digital hygrometer respectively. Quadrate sampling method (five 5 x 5 m quadrates were placed in each habitat) and Belt transect method (two 2 x 10 m transects were laid in each habitat) used to determine the abundance and population dynamics of snail fauna. The Shannon-Wiener Index was used to determine the species diversity.

The study was made in an isolated islet surrounded by Rathgama lagoon in Sri Lanka, which located in Rathgama in Gall district in southern province of Sri Lanka. The study area is located between

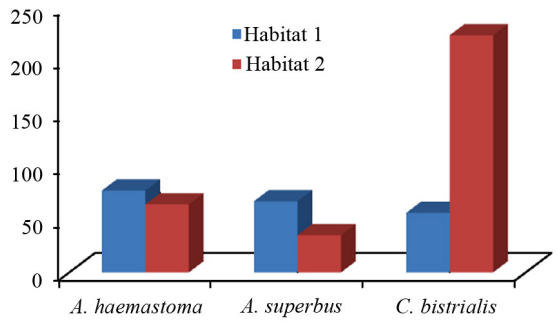

FIG. 1. Studied species abundance in two habitat types.

РИС. 1. Численность исследованных видов в двух типах местообитаний.

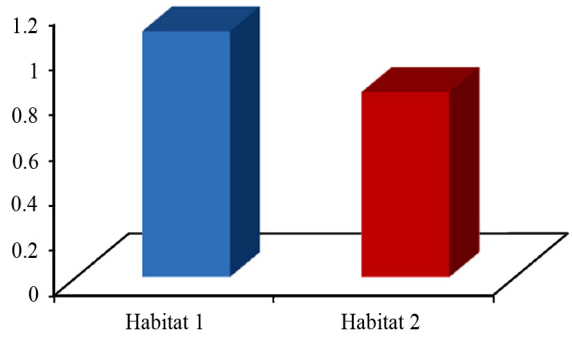

FIG. 2. Species diversity in two habitat types. Along y-coordinate — Shannon-Wiener Index

РИС. 2. Видовое разнообразие в двух типах местообитаний. По оси ординат — значение индекса Шеннона-Винера.

06°01'N and 80°14'E and approximately 15 km away from Gall city. The dominant vegetation includes mangroves and poorly maintained home gardens. The study site is a hermitage and the habitat was disturbed by minimum anthropogenic activities. The amount of leaf litter on the ground is very thick and wet. The undergrowth is moderately developed. The soil texture is rough, hard and it contains saline sandy earth. The study was done from 12.00 hr on 18th June 2007 to 12.00 hr on 20th June 2007.

Two different habitats were selected for this study. Habitat 01— is well shaded area with poor undergrowth. This habitat mainly consists of tall trees. Habitat — 02 is open area with well grown shrubs. This habitat mainly consists of *Alocasia species.*

Results and discussion

During the studies only three land snail species were recorded: *Acavus haemastoma*, *Acavus superbus* and *Cryptozona bistrialis* from the isolated islet in Rathgama lagoon and all of them live in sympatry. All species living in the above mentioned two habitats showed different population sizes. According to the results, total of 200 land snail individuals were recorded in habitat 01 (*A. haemastoma*: 77, *A. superbus*: 67 and *C. bistrialis*: 56) and 322 were recorded in habitat 02 (*A. haemastoma*: 64, *A. superbus*: 35 and *C. bistrialis*: 223). There is no discernable difference in abundance of *A. haemastoma* species between above two habitats, however, *A. superbus* and *C. bistrialis* showed considerable differences in abundance in the habitat 02 (Fig. 1).

The land snail diversity in the habitat 01 is greater than that of the habitat 02 (Shannon-Wiener Index for habitat 01: 1.089; habitat 02: 0.819) (Fig. 2). Further, during the study, it was observed that the both *A. haemastoma* and *A. superbus* were found to be always on the same tree trunks. However, further studies are needed to investigate the population dynamics of these two arboreal snails.

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Три симпатрических вида наземных брюхоногих на изолированном островке в экосистеме лагуны Ратгама, Шри Ланка

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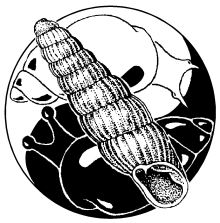
РЕЗЮМЕ. Общее число наземных брюхоногих, отмеченных в настоящее время в Шри Ланке приближается 300 и их можно сгруппировать следующим образом: эндемичные виды, не-эндемичные автохтонные виды и экзотические виды. *Acavus haemastoma* и *A. superbus* – эндемичные виды, обычные в первичных лесах и садах, расположенных вблизи лесов и имеющих большие деревья с густой кроной и хорошо развитый кустарник и молодые деревца. *Cryptozona bistrialis* – другой не-эндемичный автохтонный вид наземных брюхоногих, который обычен в лесах сухой и промежуточных зон, а во влажной зоне приурочен к сельскохозяйственным угодьям ниже 1000 м над уровнем моря. Исследована динамика популяций упомянутых трех видов на изолированном островке в экосистеме лагуны Ратгама, пров. Галл, Шри-Ланка в двух различных местообитаниях. Между различными местообитаниями были найдены существенные различия в относительной численности.



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