



PRELIMINARY STUDY OF *STRONGYLOIDES* SPP. DISTRIBUTION OF DUNUMADALAWA FOREST KANDY, SRI LANKA

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Abstract

Strongyloides is a genus of parasitic nematodes that, belonging to the family Strongylidae. Unusually, has a free-living adult generation and transmitted through the environment causing strongyloidiasis disease. Two species of *Strongyloides* infect humans. ie, *S. stercoralis* and *S. fuelleborni*. These parasites affect around an estimated 100-200 million individuals worldwide. Strongyloidiasis, in which worms, particularly larvae are potent to penetrate the gut wall and invade the other organs. This is fatal unless anti-*Strongyloides* therapy is given. Most of the previous studies have used microscopic identification techniques to the detection of *Strongyloides spp.* Understanding the distribution of these parasites in a densely populated area is important for public health authorities to assess the potential risk of human infections and implement appropriate control measures. The objective of the present study therefore was to examine the *Strongyloides spp.* Distribution in Dunumadalawa forest Kandy, Sri Lanka. Dunumadalawa (70 17'00"N; 800 38'49"E; 548-972 m above sea level) is a semi-isolated, hill country wet zone forest reserve located in Kandy District, Sri Lanka. It is approximately 480 ha in extent and comprises mainly of secondary growth forest boasting a rich diversity of flora and fauna, with a notable presence of primates and mammals. Soil samples were collected from seven sampling sites, i.e., Pine tree forest patch, Natural Forest area near pine trees, Invasive plant area-Yakadamaran – Left side from the Rosnith Lake, Invasive plant area-Yakadamaran – Right side from the Rosnith Lake, Yakadamaran removed area, Natural Forest area, Natural Forest area near entrance. Baermann funnel method was used to separate the Nematodes from the soil samples and identified the specimens using microscopic techniques. All study sites were revealed that in every 25g of soil sample, 8% -12 % filariform larvae of *Strongyloides spp.* were consistently present. Filariform larvae can be penetrated intact skin to initiate infection. Identifying where *Strongyloides spp.* is commonly found in Dunumadalawa forest will inform environmental control strategies to reduce this neglected disease.

Keywords: *Dunumadalawa*, *S. fuelleborni*, *S. stercoralis*, *Strongyloides spp.*, *Strongyloidiasis*

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INTRODUCTION

Strongyloides spp. is a genus of parasitic nematodes belonging to the family Strongylidae that have been growing in the realm of public health due to their capability to cause infections in humans and animals (Viney & Lok, 2015). Two species of Strongyloides infect humans, i.e., *S. stercoralis* and *S. fuelleborni* (Barratt & Sapp, 2020). These parasites affect around an estimated 100-200 million individuals worldwide (Rayan et al., 2012). These small but persistent parasites are known for their unique life cycle which involves both free-living and parasitic stages (Viney, 1999). Infections with Strongyloides spp. can lead to arranging of clinical appearances from mild gastrointestinal discomfort to severe and life-threatening conditions, particularly, in individuals with compromised immune systems. Strongyloidiasis, in which worms, particularly larvae, are potent to penetrate the gut wall and invade the other organs. This is fatal unless anti-Strongyloides therapy is given (Mahmoud, 1996). The geographical distribution of Strongyloides spp. is not uniform, and the prevalence of these parasites can vary significantly from one region to another. Factors such as climate, soil conditions and human behaviour play important roles in determining the distribution and prevalence of Strongyloides spp. Infections (Schär et al., 2013). As a result, understanding the local distribution of these parasites is crucial for effective control and prevention measures. This preliminary study focused on the distribution of Strongyloides spp. in the Dunumadalawa Forest Kandy, Sri Lanka. Dunumadalawa Forest region of Kandy, Sri Lanka. Kandy, a city renowned for its cultural heritage and lush greenery, is also home to diverse wildlife and ecological niches, making it an interesting area for studying the presence and prevalence of parasitic nematodes like Strongyloides spp. This study aimed at shedding light on the local distribution patterns of Strongyloides spp. in this particular ecosystem, providing valuable insights into the potential health risks posed to both wildlife and the human population in the region. The Dunumadalawa Forest, with its unique ecological characteristics, offers an ideal setting for investigating the presence of Strongyloides spp. The forest diverse flora and fauna, along with its proximity to human settlements, raise intriguing questions about the interactions between wildlife, domestic animals and the transmission of these parasitic nematodes. By conducting this preliminary study, we seek to lay the foundation for future research in this area, with the ultimate goal of improving our understanding of Strongyloides spp. distribution dynamics and developing targeted strategies for disease control.

METHODOLOGY

Study site

The present study was carried out in Dunumadalawa Forest Kandy, Sri Lanka. Dunumadalawa ((70 17' 00" N; 800 38' 49" E; 548-972 m above sea level) is a semi-isolated hill country wet zone forest reserve located in Kandy District, Sri Lanka. It is approximately 480ha in extent and comprises mainly of secondary growth forest boasting of a rich diversity of flora and fauna with a notable presence of primates and mammals.



Field sampling

The study was conducted from January to June, 2022. The study sites were visited twice a month. Surface level, ground level and deep ground level soil samples were collected from seven different study sites, i.e., pine tree forest patch, natural Forest area near pine trees, invasive plant area-Yakadamaran – left side from the Rosnith Lake, invasive plant area-Yakadamaran – right side from the Rosnith Lake, Yakadamaran removed area, natural forest area, natural forest area near the entrance. Twenty-five grams from each collected soil sample were used for the baermann extraction. Baermann funnel method was used to separate the Nematodes from the soil samples. Extracted specimens were identified using microscopic techniques.

RESULTS AND DISCUSSION

The results suggested that the *Strongyloides* spp. were distributed in all study sites. Minimum percentage of 8% and maximum 12% were revealed in every 25g of soil sample, and these results offer valuable insights into the distribution of strongyloides spp. across various study sites and soil samples. The results determine substantial variability in the presence of these soil-dwelling organisms, shedding light on potential ecological dynamics within these ecosystems. Outstandingly, sites such as the "invasive plant area-Yakadamaran – right side from the Rosnith Lake" and "Yakadamaran removed area" exhibited higher counts of *Strongyloides* spp. in surface and ground soil samples, suggesting a potential link between invasive plant colonization and the prevalence of these organisms. On the other hand, the complete absence of *Strongyloides* spp. in the "pine tree forest patch" and "pine tree forest patch - deep ground" indicates the existence of specific soil conditions or habitat preferences that inhibit their presence. In addition, the consistent occurrence of *Strongyloides* spp. in "natural forest area near pine trees" and "natural forest area near the entrance" warrants further investigation into the environmental factors motivating this pattern. Overall, these findings underscore the complexity of soil ecology and emphasize the need for in-depth research to unravel the intricate interactions shaping the distribution of *Strongyloides* spp. in these ecosystems. This study's results offer valuable insights for ecosystem management and conservation efforts providing a foundation for future investigations into soil-dwelling organisms and their ecological significance.

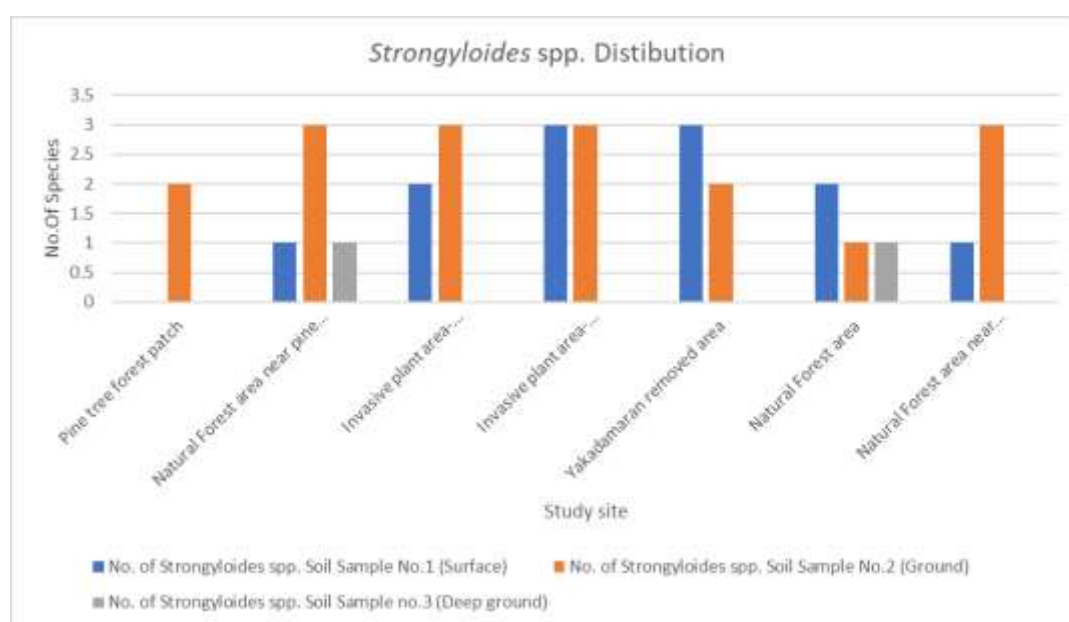




Figure 1: Distribution of Strongyloides spp. in selected study sites in Dunumadalawa Forest

The findings of this study shed light on the complex dynamics governing the distribution of Strongyloides spp. within various ecosystems and soil profiles. Notably, the elevated counts of these soil-dwelling organisms in the "invasive plant area-Yakadamaran – right side from the Rosnith Lake" and the "Yakadamaran removed area" suggest a potential link between invasive plant colonization and the prevalence of Strongyloides spp. These invasive plants may alter soil properties or nutrient availability, inadvertently creating a more hospitable environment for these microorganisms. Further research is imperative to elucidate the nature of this relationship and assess whether Strongyloides spp. have any reciprocal impact on the success of invasive plant species. Conversely, the conspicuous absence of Strongyloides spp. in the "pine tree forest patch" and "pine tree forest patch - deep ground" raises intriguing questions about the specific soil conditions or habitat preferences that deter their presence. Investigation into the underlying factors responsible for this absence may provide valuable insights for forest management strategies and conservation initiatives. Additionally, the consistent presence of Strongyloides spp. in "natural forest area near pine trees" and "natural forest area near the entrance" merits further exploration to better comprehend the ecological forces at play in these particular settings. These findings collectively underscore the intricate and multifaceted nature of soil ecology urging for continued research to unravel the intricate interactions shaping the distribution of Strongyloides spp. in diverse ecosystems. Such knowledge not only enriches our understanding of soil microfauna but also carries implications for ecosystem management and conservation efforts.

CONCLUSIONS/RECOMMENDATIONS

In conclusion, identifying where Strongyloides spp. is commonly found in Dunumadalawa Forest will inform environmental control strategies to reduce this neglected disease. The common locations of Strongyloides spp. in the Dunumadalawa Forest is pivotal for developing effective environmental control strategies to combat this neglected disease. To this end, we recommend conducting further research to understand the ecological factors driving Strongyloides spp. distribution, implementing disease surveillance programmes and considering habitat restoration efforts if invasive plants are implicated in the prevalence of these organisms. These recommendations collectively aim at enhancing our capacity to prevent and manage Strongyloidiasis in the region ultimately safeguarding the health of the ecosystem and its inhabitants.



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