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Distribution, Diversity and Relative Abundance of Fireflies (Coleoptera; Lampyridae) in Three Habitat Types in Sri Lanka

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ABSTRACT

Since early 18th century no proper scientific investigations have been conducted on aspects of systematics, ecology and conservation value of Sri Lankan fireflies. The present survey was conducted to study the distribution, relative abundance and species diversity of fireflies in three habitat types in nine Provinces of Sri Lanka. Field studies were carried out from 6.00 p. m. to 10.00 p. m. in selected terrestrial grasslands, freshwater associated lands and paddy fields in each province from January 2010 to January in 2012. Out of the reported 14 firefly species encountered, 9 species belonged to the Subfamily Luciolinae, 3 species to the Subfamily Lampyrinae, 2 species to the Subfamily Ototretadrilinae- Ototretinae.. Results indicate that Luciolinae fireflies are the most abundant group of fireflies in Sri Lanka. The nine species of Subfamily Luciolinae belonged to the 5 genera *Abscondita* (3 species), *Luciola* (3 species), *Asymmetricata* (1 species), *Curtos* (1 species) and *Sclerotia* (1 species).The three species in Subfamily Lampyrinae belonged to the genus *Diaphanes* (2 species) and *Lamprigera* (1 species). The Subfamily Ototretadrilinae included the genus *Stenocladius* (2 species). The study reports the first record of the firefly Genus *Curtos* in Sri Lanka. The mean difference of firefly abundance among nine provinces of Sri Lanka is significantly different (ANOVA, n=9, F= 6.523, d. f.= 8, *P*= .000). The mean difference of firefly abundance in Uva (*P*= .001), Sabaragamuwa (*P*= .001) and Southern (*P*= .000) is significantly high than that of other Provinces. The mean abundance of *Abs. perplexa* and *Asy. humeralis* is significantly different among other recorded 12 firefly species throughout the country (ANOVA, n=14, F= 20.131, d. f.= 13, *P*= .000, *P*= .000). *Sclerotia cingulata* was the common firefly species in freshwater associated lands. The Uva Province recorded the highest species richness and diversity. Grassland habitat reported the highest diversity index for fireflies.

1. Introduction

Fireflies or lampyrids are a group of nocturnal insects in both terrestrial and aquatic ecosystems, and also in both temperate and tropical climates throughout the world [1].

Fireflies are distributed worldwide with the greatest diversity of species occurring in the Oriental as well as in the Neotropical regions and nearly 2,000 species and more than 90 genera of fireflies (Family: Lampyridae) known from the world [2] inhabiting mainly in tropical and temperate regions [3]. However, Mc Dermmot [2] recognized 1097 species of lampyrids belongs to 53 genera in worldwide. Two hundred and eighty species of fireflies have been recorded in warmer regions of Asia [4].

Pioneering studies on Sri Lankan fireflies, reported 29 [5, 6] to 30 [2] species from the country. Tennent [7] in his seminal work “The list of Animals in Ceylon”, listed 28 species of fireflies belongs to five genera. However, these historical collections were not based on systematic field sampling. Recently, studies have been conducted to investigate the distribution and species composition of fireflies in selected agro-ecosystems in Southern

Province of Sri Lanka [8, 9]. Furthermore, Wijekoon et al. [10] explored the diversity of Luciolinae fireflies in Sri Lanka. They have been identified 9 species of fireflies tentatively from Sri Lanka.

However, a countrywide survey is essential on ecological and biogeographically understanding of Sri Lankan fireflies in addition to their systematic identification because ecological studies are obviously lags and even far behind compared to the taxonomic studies [8]. Hence, given their ecological significance, the paucity of studies the rapid decline of global and local biodiversity, urgent action is needed to carry out a systematic sampling of fireflies in Sri Lanka.

The objective of this study is to document the abundance and diversity of fireflies in nine provinces in Sri Lanka. The outputs from our study will provide a greater understanding of the taxonomic diversity of fireflies in Sri Lanka, which is fundamental towards conserving the diversity of Lampyrids

Objective

The objective was to study the relative abundance, distribution and species diversity of fireflies (Coleoptera; Lampyridae) among three types of habitats in nine Provinces of Sri Lanka.

2. Materials and Methods

2.1 Time duration of the study

The preliminary study was carried out from November to December 2009 followed by a detailed study from January 2010 to January in 2012.

2.2 Sites selection of the study

All nine Provinces of Sri Lanka, Uva, Sabaragamuwa, Southern, Western, Central, Eastern, Northern, North-Western, North- Central were selected for the study.

Sampling sites in each province were selected based on different habitats types/vegetation types in the region (Figure 01 & Table 01). The preliminary study revealed that adult fireflies were more common in three types of habitats, terrestrial grasslands, paddy fields and freshwater associated lands.

2.3 Collection of Specimens

10×10 m^2 quadrats were placed in each habitat to quantity firefly diversity. Eight sampling rounds, each spanning three months were conducted from January 2010 to January in 2012. Selected sites in all Provinces were visited during each sampling round. Between 6.00 p. m. to 9.00 p. m. adult fireflies were observed using standard size (30.5 cm/ 12 inch) insect hand net within a selected quadrat in each habitat. Observed all adults (both flying male & female) were collected. Collected individuals were temporally put in to transparent polythene bags in the field. Most captured fireflies were identified to species in the field, counted adults and then released back to their habitats. Individuals that could not be identified in the field were brought to the laboratory to confirm their identity later. Specimens were transported to the laboratory by storing in plastic containers and preserved in 70% ethanol medium in the laboratory.

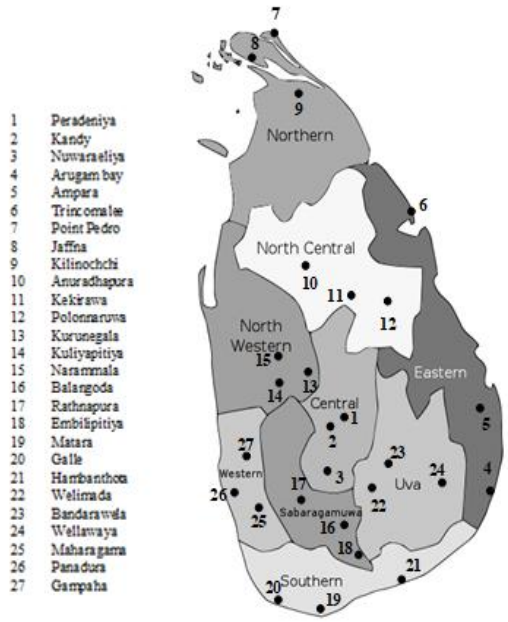

Figure 01: Sub-sampling sites of nine Provinces of Sri Lanka

2.4 Identification of species

Individuals were identified to the genus or species level visually in the field using their morphological features such as body dorsal and ventral colour, light organ shape, number of light segments and antenna type. Sex of the each species was determined using the number of light segments on the ventral side of the abdomen (male has two light segments and female has one light segment). A colour photograph of type specimens of fireflies was used to identify them at the field. Firefly specimens transported to laboratory were identified using firefly taxonomic keys, [11,12,13,14, 15] and also photographs of type specimens. Identified species were also compared with specimens in the firefly repository collection at Department of National Museums, Colombo.

2.5 Ethics statement

The permission for this study was granted by the Department of wild life, Sri Lanka and Department of National Museums, Colombo, Sri Lanka provided access to repository firefly specimens.

Table 01: Description of the selected habitats of nine Provinces of Sri Lanka

Province	Sub-sampling sites/ Locality	Latitude & Longitude	Habitat/ Vegetation type
Uva	Welimada	6° 54′ 04″ N,80° 55′ 22″ E	Freshwater associated land
	Bandarawela	6° 50′ 0″ N, 80° 59′ 0″ E	Paddy cultivation
	Wellawaya	6° 44' 0'' N, 81° 6' 0''E	Terrestrial grassland
Sabaragamuwa	Balangoda	6° 39′ 0″ N, 80° 41′ 0″ E	Freshwater associated land
	Ratnapura	6° 40′ 0″ N, 80° 24′ 0″ E	Paddy cultivation
	Embilipitiya	6° 20′ 38″ N,80° 50′ 56″ E	Terrestrial grassland
Southern	Matara	5° 57′ 0″ N, 80° 33′ 0″ E	Terrestrial grassland
	Galle	6° 3′ 0″ N, 80° 13′ 0″ E	Freshwater associated land
	Hambanthota	6° 7′ 28″ N, 81° 7′ 21″ E	Paddy cultivation
Central	Peradeniya	7° 16′ 0″ N, 80° 36′ 0″ E	Terrestrial grassland
	Kandy	7° 17′ 47″ N, 80° 38′ 6″ E	Paddy cultivation
	Nuwaraeliya	6° 58′ 0″ N, 80° 46′ 0″ E	Freshwater associated land
Western	Maharagama	6° 51′ 0″ N, 79° 59′ 0″ E	Freshwater associated land
	Panadura	6° 42′ 48″ N,79° 54′ 15″ E	Paddy cultivation
	Gampaha	7° 5′ 30″ N, 79° 59′ 59″ E	Terrestrial grassland
North Western	Kurunegala	7° 29′ 0″ N, 80° 22′ 0″ E	Terrestrial grassland
	Kuliyapitiya	7° 28′ 14″ N, 80° 2′ 44″ E	Paddy cultivation
	Narammala	7° 26′ 4″ N, 80° 13′ 17″ E	Freshwater associated land
Northern	Point Pedro	9° 49′ 0″ N, 80° 14′ 0″ E	Terrestrial grassland
	Jaffna	9° 40′ 0″ N, 80° 0′ 0″ E	Paddy cultivation
	Kilinochchi	9° 23′ 0″ N, 80° 24′ 0″ E	Freshwater associated land
Eastern	Arugam bay	6° 51′ 0″ N, 81° 50′ 0″ E	Terrestrial grassland
	Ampara	7° 5′ 0″ N, 81° 45′ 0″ E	Paddy cultivation
	Trincomalee	8° 34′ 0″ N, 81° 14′ 0″ E	Freshwater associated land
North Central	Anuradhapura	8° 21′ 0″ N, 80° 23′ 0″ E	Paddy cultivation
	Kekirawa	8° 2' 0'' N, 80° 36' 0''E	Freshwater associated land
	Polonnaruwa	7° 56′ 0″ N, 81° 0′ 0″ E	Terrestrial grassland

2.6 Data analysis

Three indices such as Species richness, relative abundance and Shannon-Weiner diversity were estimated.

▪Species richness of the fireflies those recorded from each Province was calculated. In addition, the percentage of species in each Province was calculated relative to the total number of species recorded in all Provinces of Sri Lanka during the study period.

▪Abundance (total number of individuals $=\sum n_i$ where $n_i$is the number of each species) was calculated using the total number of individuals observed during the 4 hours counting period per day.

▪Species diversity of fireflies in each Province was calculated by Shannon – Wiener species diversity index.

$$H = -\sum_{1}^{0} P_i \ln P_i$$

H- Diversity

Pi- The propotion of species "i"

- Distribution (where the members of the species are located)

In addition, data was analyzed using IBM SPSS statistics data editor 20.0 version. One way ANOVA test was applied to test whether any significant different occur in species diversity and abundance of fireflies among habitats and among provinces. The level of significant was at $\alpha = 0.05$. In addition, chi-square test was applied to check the association between firefly abundance and habitat types.

3. Results

3.1 Recorded species of fireflies from selected habitats in nine Provinces of Sri Lanka

During the study, 14 nocturnal species of fireflies in eight genera in three subfamilies were identified from selected habitats in nine Provinces of Sri Lanka (Table 02). Among them, genus *Curtos* fireflies were recorded for the first time in Sri Lanka. Recorded three subfamilies are Luciolinae, Lampyrinae and Ototretadrilinae- Ototretinae complex. Among the recorded genera of fireflies, genus *Abscondita* and *Luciola* show the highest number of species including three species by each genus. One firefly species in each of Genus, *Asymmetricata, Curtos, Sclerotia* and *Lamprigera* was recorded.

3.2 Distribution of fireflies in Sri Lanka

Results indicated that two Luciolinae fireflies such as *Abs. perplexa* and *Asy. humeralis* showed a high abundance among all Provinces of Sri Lanka. The mean abundance of *Abs. perplexa* and *Asy. humeralis* is significantly different among other recorded 12 firefly species throughout the country (ANOVA, n=14, F= 20.131, d. f.= 13, *P*= .000, *P*= .000).Recorded other firefly species were observed from the habitats in one or several Provinces during the study period (Table 03).

The mean difference of firefly abundance among nine provinces of Sri Lanka is significantly different (ANOVA, n=9, F= 6.523, d. f.= 8, *P*= .000). The mean difference of firefly abundance in Uva (*P*= .001), Sabaragamuwa (*P*= .001) and Southern (*P*= .000) is significantly high than that of other five Provinces such as Central, Western, Eastern, Northern and North central.

Table- 02: Recorded species of fireflies from selected habitats in nine Provinces of Sri Lanka

No	Subfamily	Genus	Species
1	Luciolinae	*Abscondita*	*Abs. perplexa* (Walker, 1858)
2			*Abs. promelaena* (Walker, 1858)
3			*Abscondita* sp. (Walker, 1858)
4		*Asymmetricata*	*Asy. humeralis* (Walker, 1858)
5		*Curtos*	*C. costipennis* (Gorham, 1880)
6		*Luciola*	*L. extricans* (Walker, 1858)
7			*L. horni* (Bourgeois, 1905)
8			*L. praeusta* (Kiesenwetter, 1874)
9		*Sclerotia*	*Scl. cingulate* (Olivier, 1885)
10	Lampyrinae	*Diaphenes*	*D. lutescens* (Walker, 1858)
11			*D. vitrifera* (Walker, 1858)
12		*Lamprigera*	*L. tenebrosa* (Walker, 1858)
13	Ototretadrilinae-Ototretinae complex	*Stenocladius*	*Stenocladius* sp. 1 (Fairmaire, 1878)
14			*Stenocladius* sp. 2 (Fairmaire, 1878)

Table- 03: Distribution of fireflies recorded from nine Provinces of Sri Lanka

	Recorded species	Uva	Sabaragamuwa	Southern	Central	Western	Eastern	Northern	NorthWestern	NorthCentral
1	*Abscondita perplexa*	√	√	√	√	√	√	√	√	√
2	*Abscondita promelaena*	√	√	√		√				
3	*Abscondita* sp.								√	
4	*Asymmetricata humeralis*	√	√	√	√	√	√	√	√	√
5	*Curtos costipennis*	√		√					√	
6	*Sclerotia cingulata*	√	√	√						
7	*Luciola extricans*		√	√						
8	*Luciola horni*	√								
9	*Luciola praeusta*	√	√						√	
10	*Lamprigera tenebrosa*	√	√	√	√	√			√	√
11	*Diaphanes lutescens*	√	√						√	
12	*Diaphanes vitrifera*	√								
13	*Stenocladius* sp. 1	√	√	√						
14	*Stenocladius* sp. 2			√						

3.3 Species richness of fireflies among nine Provinces of Sri Lanka

The highest species richness and the percentage of species of fireflies were observed from Uva Province. The lowest species richness and percentage of species were recorded from two Provinces: Eastern and Northern (Table 04).

3.4 Relative abundance, habitat and regional diversity of fireflies among selected habitats of nine Provinces of Sri Lanka

According to the Figure 02, the relative abundance of fireflies was higher in four Provinces namely Uva, Sabaragamuwa, Southern and Northwestern than that of other five Provinces of Sri Lanka. Among the above four Provinces, the highest relative abundance of fireflies was recorded from Uva Province. Sabaragamuwa Province indicated the secondly highest relative abundance than Southern and Northwestern Provinces. The relative abundance of fireflies was low in five Provinces namely Central, Western, Eastern, Northern and North central. Among those, Eastern Province indicated the relatively high abundance of fireflies while the lowest abundance recorded from Northern Province.

Out of the selected three habitats, the highest relative abundance of fireflies was recorded from terrestrial grasslands than that of other two types of habitat in Sri Lanka. Freshwater associated lands indicated the secondly highest abundance in three Provinces, namely Uva, Sabaragamuwa and Northwestern. Paddy lands indicated the relatively less abundance of fireflies in above mentioned three Provinces. Relative abundance of fireflies in paddy lands was high in Southern, Western and Eastern Provinces. There is no significant association between mean firefly abundance and habitat types x^2 (2, N=80) =.008, p= .996.

Table 04: Species richness and percentage of fireflies recorded from nine Provinces of Sri Lanka

Province	Species richness	Percentage of species %
Uva	11	78.60
Sabaragamuwa	9	64.28
Southern	9	64.28
North Western	7	50.00
Western	4	28.57
Central	3	21.42
Eastern	2	14.28
Northern	2	14.28
North Central	3	21.42

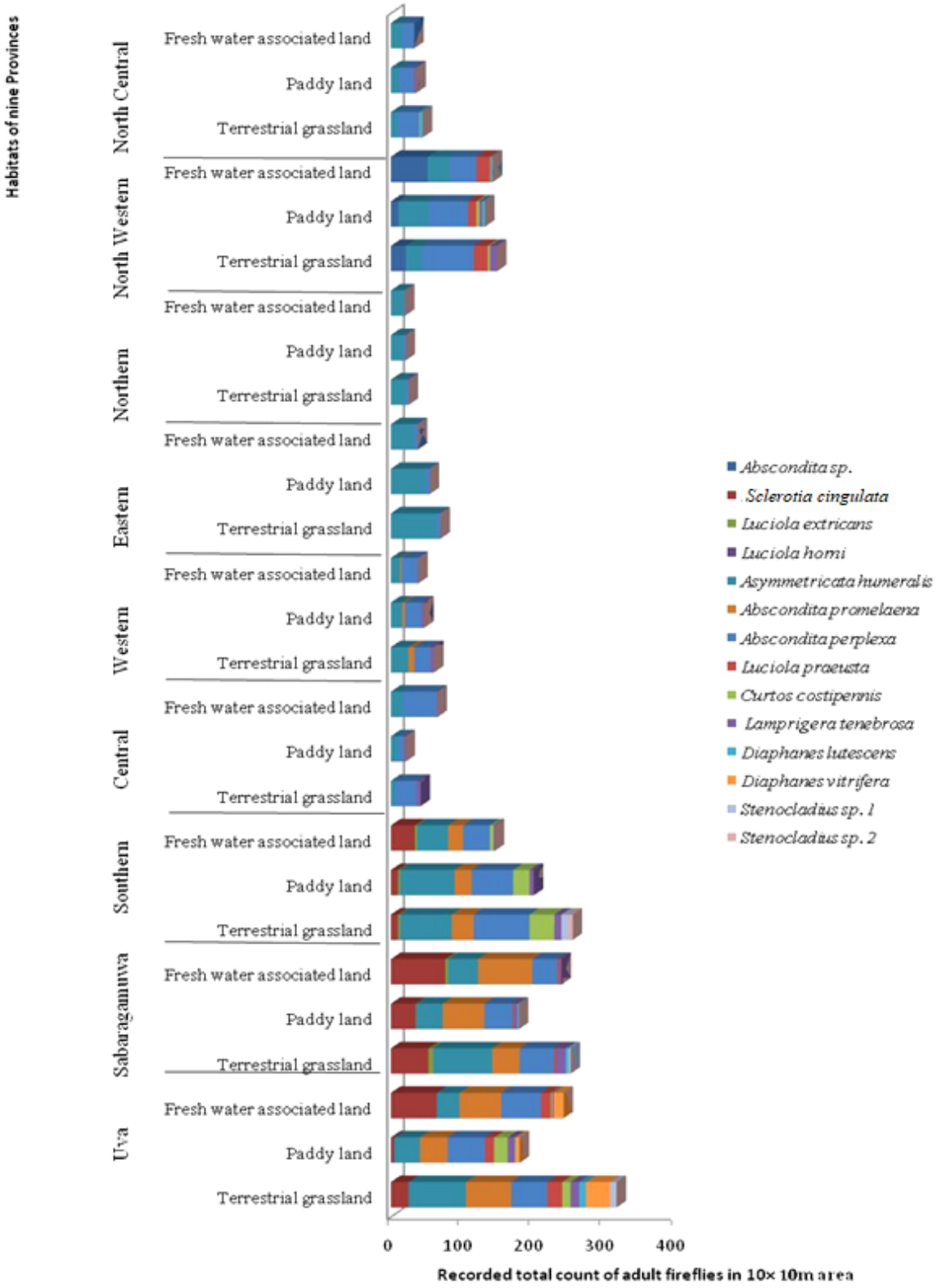

Figure 02: Relative abundance, habitat and regional diversity of fireflies recorded among three types of habitats in nine provinces of Sri Lanka

Among the recorded species of fireflies from nine Provinces of Sri Lanka, *Sci. cingulata* and *Abscondita* sp. were commonly seen in freshwater associated lands of Sri Lanka. Four species such as *Abs. perplexa, Abs. promelaena, L. praeusta* and *L. extricans* were recorded from all three types of habitats in Sri Lanka.

The total number of fireflies colected in each habitat in each Province is mentioned in appendix 01.

3.5 Diversity

3.5.1 Diversity of fireflies among nine Provinces of Sri Lanka

The data are presented in Tables 05 and 06.

Table 05: Shannon- Wiener diversity of fireflies in nine Provinces of Sri Lanka

Province	Shannon- Wiener diversity
Uva	1.989
Sabaragamuwa	1.656
Southern	1.638
Central	0.871
Western	1.128
Eastern	0.334
Northern	0.398
North Western	1.560
North Central	0.836

3.5.2 Diversity of fireflies among selected habitats of Sri Lanka

Table 06: Shannon- Wiener diversity of fireflies among selected habitats of Sri Lanka

Habitat	Terrestrial grasslands	Paddy fields	Freshwater associated lands
Shannon-Wiener diversity	1.676	1.572	1.521

The terrestrial grassland habitat had the highest Shannon-Wiener diversity of fireflies in Sri Lanka while habitats associated with freshwater lands had the lowest species diversity.

4. Discussion

This study focused on the relative abundance and diversity of fireflies identified from selected habitats in nine Provinces of Sri Lanka. During the study, 14 species of fireflies were identified from the selected three types of habitats in Sri Lanka and the highest number of species was recorded from genus *Luciola*. Ballantyne [12] mentioned the genus *Luciola* represents 163 species in South-east Asia and is the highest number of species per genus when compare with other genera of Luciolinae. Three firefly species were recorded from genus *Abscondita* in present study and five species of *Abscondita* are recorded in South-east Asia [16]. Only single species of each was recorded in genus *Asymmetricata* and genus *Curtos* in present study and two species of genus *Asymmetricata* are described by Ballantyne [11], and 17 species of genus *Curtos* are recorded by Ballantyne [2] from South-east Asian region. *L. tenebrosa*has been originally described using the specimens collected from Sri Lanka (as Ceylon) [12]. Among the recorded two *Diaphanes* species, *D. lutescens* has been originally described using the specimens collected from Sri Lanka [2].

According to the results of relative abundance and distribution of subfamily Luciolinae fireflies, two species namely *Abs. perplexa* and *Asy. humeralis* highly abundant in habitats of all Provinces while other recorded species were not significantly abundant among all provinces and only recorded from one or several Provinces during the study. Ballantyne et al.[16] cited several Luciolinae species which have yellow/ orange pronotum and elytra are widespread in range of localities in South-east Asia.

Two species of Luciolinae namely, *Sci. cingulata* and *Abscondita* sp. commonly recorded from freshwater associated lands of Sri Lanka. *S. cingulate* has been assigned to the subdivision of *L. substriata* complex and most of the described larvae of species in *L. substriata* complex are aquatic or semiaquatic [11]. Recently, Ballantyne et al, [19] introduced a new genus, *Sclerotia* and members previously described in *L. substriata* complex transferred to *Sclerotia* from *Luciola*. The larvae of *Scl. cingulata* might be aquatic or semiaquatic because of the adult behavior of fireflies always depend on their larval association [11]. It might be the reason to have high abundance of *Scl. cingulata* from freshwater associated habitats. In the study, *Scl. cingulate* was found from three Provinces such as Uva, Sabaragamuwa and Southern. Fernando [18] recorded *Scl. cingulata* from Southern Province of Sri Lanka. During the study, *Abscondita* sp. was recorded frequently from freshwater associated lands of the North Western Province.

Four species such as *Abs. perplexa, Abs. promelaena, L. praeusta* and *L. extricans were* commonly reported from all sampled habitats in Province. Among them, *Abs. perplexa* showed the significantly high distribution in all provinces indicating the ability of survival in different geographical areas in Sri Lanka. The recorded larva of *Abs. perplexa* is terrestrial [16]. As such *Abs. perplexa* have a terrestrially adapted life cycle. Ballantyne et al. [11] mentioned that members of *L. praeusta* complex might have terrestrial larvae and the recorded species, *L. praeusta* also belongs to that complex. During the study, *Abs. promelaena*

was recorded from four Provinces such as Uva, Sabaragamuwa, Southern and Western. *L. praeusta* observed from three Provinces such as Uva, Sabaragamuwa and North Western and *L. extricans* observed from two Provinces such as Sabaragamuwa and Southern. Fernando [18] stated *L. melaspis* (now *Abscondita promelaena*) recorded from Southern Province of Sri Lanka. In the study, *C. costipennis* was common for all types of habitats in North Western Province. Whereas, this species has terrestrial life cycle and their larvae is terrestrial [11, 14, 16]. *L. horni* was recorded from paddy lands of Uva Province during the period of January to April in 2011 and they were no longer found in the study. They may be one of rarest species of fireflies because Ballantyne *et al*. [17] statement, *Luciola* species which have black elytra are not widespread in South-east Asia.

Asy humeralis significantly recorded among habitats of all Provinces of Sri Lanka. They also might have the survival ability under different geographical conditions of various regions in the country. During our study, *Asy. humeralis* commonly reported from both terrestrial grassland and paddy lands of six Provinces such as Uva, Sabaragamuwa, Southern, Western, Eastern and Northern of Sri Lanka. However, *Asy. humeralis* was common in both paddy lands and freshwater associated lands of Central, North Western and North Central Provinces during the study. The larva of *Asy. humeralis* is terrestrial [11]. Hence, *Asy. humeralis* may have terrestrial life cycle, although they have been recorded from other habitats during the study.

According to the results of abundance and diversity of Lampyrinae fireflies, *L. tenebrosa* was commonly recorded from grassland habitats than that of the other two types of habitats in Sri Lanka. Jeng et al. [21] mentioned that larvae and pupae of *L. tenebrosa* are well adapted to the terrestrial conditions. This species was observed in selected habitats of seven Provinces apart from Eastern and Northern. Similarly, *D. lutescens* and *D. vitrifera* have terrestrial larvae and life cycle [22] and that may be a reason for high abundance of *Diaphanes* spp. in terrestrial grasslands during this study. *D. vitrifera* was recorded only from the selected habitats of Uva Province.

The relative abundance of fireflies was higher in selected habitats of Uva, Sabaragamuwa, Southern and North Western Provinces of Sri Lanka. All selected habitats of Uva and North Western Provinces are located in the Intermediate Zone. Selected terrestrial grassland and freshwater associated land in Southern Province and the selected Freshwater associated land and paddy land in Sabaragamuwa Province are located in Wet Zone. Although Western Province is located in the Wet Zone, comparatively less relative abundance of fireflies was recorded from these habitats. Western Province is consisted with many urbanized areas than other Provinces of Sri Lanka.

The recorded fireflies have significant regional diversity and distribution and interestingly, their distribution in Uva, Sabaragamuwa and Southern provinces is significantly high. The preferable climatic conditions and less disturbed habitats might be reasons to have high firefly distribution in those areas.

The highest species richness was observed in Uva Province and the lowest value was recorded from four Provinces such as Central, Eastern, Northern and North Central. The surrounding areas of habitats selected in Uva Province had not susceptible for anthropogenic activities because fireflies are one of good indicator to represent the environmental quality [23].

The highest value of Shannon-Wiener diversity index of fireflies was observed in Uva Province and the lowest diversity index was observed in Eastern Province of Sri Lanka. The highest number of species of fireflies and the higher proportions of their species occurrence were observed in Uva Province during the study.

Among the selected three types of habitats, the highest value of Shannon-Wiener diversity index of fireflies was observed in terrestrial grassland habitat and the lowest diversity index was observed in freshwater associated land. Comparatively, high proportions of the occurrence of fireflies were observed in terrestrial grassland habitat during the study.

Study results on distribution, diversity and relative abundance of fireflies in Sri Lanka could be useful as guideline information for similar studies in future.

5. Conclusion

In the present study, 14 species of fireflies recorded including 9 species of Subfamily Luciolinae belongs to the five genera, *Abscondita* (3 species), *Luciola* (3 species.), *Asymmetricata* (1 species), *Curtos* (1 species) and *Sclerotia* (1 species), three species in Subfamily Lampyrinae belong to the genera *Diaphanes* (2 species) and *Lamprigera* (1 species) and two species of genus *Stenocladius* in Subfamily Ototretadrilinae from three types of habitats in nine Provinces of Sri Lanka. The study reports the first record of the firefly Genus *Curtos* in Sri Lanka. Recorded fireflies show significant regional abundance and diversity among Provinces including significantly high

diversity in Uva, Sabaragamuwa and Southern. The abundance of .*Abs. perplexa* and *Asy. humeralis* is significantly high among all Provinces of Sri Lanka. The highest species richness and the diversity index of fireflies reported from Uva Province. The terrestrial grassland habitat shows the highest diversity index for fireflies in Sri Lanka.

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Appendix 01: Total number of individuals of fireflies recorded from nine provinces in Sri Lanka

Province	Habitat	*Abscondita* sp.	*Scle. cingulata*	*L. extricans*	*L. horni*	*Asy. humeralis*	*Abs. promeleana*	*L. praeusta*	*Abs. perplexa*	*Curtos costipennis*	*Lamprigera tenebrosa*	*Diaphenes vitrifera*	*Diaphenes lutecense*	*Stenocladiu ssp .1*	*Stenocladiu ssp .2*
Uva	Te.G.H.	0	25	0	0	81	64	21	51	12	12	34	10	9	0
	Cu. H.	0	04	0	01	36	39	13	53	19	10	6	1	0	0
	F.A.H.	0	65	0	0	32	59	14	56	02	2	14	0	0	0
Sabara-gamuwa	Te.G.H.	0	53	07	0	83	39	03	49	0	13	0	4	3	0
	Cu. H.	0	35	01	0	37	59	02	40	0	5	0	2	0	0
	F.A.H.	0	77	04	0	42	77	03	36	0	2	0	0	0	0
Southern	Te.G.H.	0	10	03	0	73	31	0	79	35	10	0	0	10	6
	Cu. H.	0	10	03	0	77	24	0	59	23	6	0	0	0	0
	F.A.H.	0	34	03	0	44	21	0	38	05	2	0	0	0	0
Central	Te.G.H.	0	0	0	0	06	0	0	30	0	6	0	0	0	0
	Cu. H.	0	0	0	0	10	0	0	08	0	3	0	0	0	0
	F.A.H.	0	0	0	0	17	0	0	48	0	1	0	0	0	0
Western	Te.G.H.	0	0	0	0	25	08	0	22	0	6	0	0	0	0
	Cu. H.	0	0	0	0	16	04	0	23	0	4	0	0	0	0
	F.A.H.	0	0	0	0	13	02	0	23	0	1	0	0	0	0
Eastern	Te.G.H.	0	0	0	0	64	0	0	06	0	0	0	0	0	0
	Cu. H.	0	0	0	0	49	0	0	06	0	0	0	0	0	0
	F.A.H.	0	0	0	0	33	0	0	05	0	0	0	0	0	0
Northern	Te.G.H.	0	0	0	0	21	0	0	04	0	0	0	0	0	0
	Cu. H.	0	0	0	0	17	0	0	04	0	0	0	0	0	0
	F.A.H.	0	0	0	0	19	0	0	01	0	0	0	0	0	0
NorthWestern	Te.G.H.	21	0	0	0	23	0	20	73	03	10	0	0	0	0
	Cu. H.	11	0	0	0	42	0	12	56	04	4	0	4	0	0
	F.A.H.	52	0	0	0	31	0	19	38	01	1	0	2	0	0
NorthCentral	Te.G.H.	0	0	0	0	10	0	0	27	0	2	0	6	0	0
	Cu. H.	0	0	0	0	12	0	0	20	0	4	0	0	0	0
	F.A.H.	0	0	0	0	16	0	0	17	0	0	0	0	0	0

(Te.G.H. : Terrestrial Grassland Habitat, Cu. H. : Cultivated Habitat, F.A.H.: Freshwater associated Habitat)