Fireflies in the grounds of the Forest Research Institute Malaysia: Studies on their diversity and seasonality

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• A tropical research institution
• Tranquil landscape, forested area and recreational functions.
• Area size: 486 hectre
• Consists of:
  – Arboreta
  – Camping site
  – Nature trails
  – Gardens (eg: botanic, ethno-botanic)
Nature awareness for children  
Nature education for teenagers  
Night walk activities
Fireflies in FRIM

• Guided night walks in FRIM.
• Sightings of fireflies during such walks.
• Fireflies sighted during preliminary visit to two trails in FRIM in July 2010.
• Only a small record of the firefly in FRIM is available.
• Potential of the presence of fireflies in FRIM as another attraction to visitors

Study objectives:
1. To identify the diversity and distribution of fireflies in FRIM.
2. To determine any seasonality effect on firefly distribution and abundance.
Preliminary study of the diversity of fireflies in FRIM

Materials and Methods
The 8 trails and 5 areas sampled in FRIM

1. Salleh Trail
2. Keruing Trail
3. Rover Track
4. Canopy Walkway Trail
5. Waterfall Trail*
6. Engkabang Trail
7. Nightwalk Trail*
8. Sebasah Trail
9. Picnic Area
10. Dipterocarp Arboretum
11. Non-dipterocarp Arboretum
12. Fruit Arboretum
13. Wetland
Photographing & recording of observations

Laying of transect line in sampling area

Trekking along the trails

Tree ID made by Kamarudin Salleh
Method

Searching for firefly in between the groundcover

Insect nets used to catch flying fireflies

Active searching at night
- Collection of fireflies were made at night using insect sweeping nets and soft forceps.

Firefly larvae thrive in shallow streams
Preliminary study of the diversity of fireflies in FRIM

Results
*Diaphanes* sp. (Sp. 1)

*Diaphanes* sp. (Sp. 2)

*Abscondita* sp.

*Colophotia* sp.
*Pyrocoelia* sp.

*Lucidina* sp.

*Pyrocoelia* sp.
Lamprigera sp.

Drilaster sp.

Stenocladius sp. (Sp. 1)

Stenocladius sp. (Sp. 2)
• From the survey it was found that:
  – The Rover track had the highest firefly species richness.
  – The Night walk trail recorded the highest number of adult fireflies.
Seasonality study of the firefly

Material and Method
Based on the previous study conducted, two trails were selected for the seasonality study.

Rover track was selected because it had the highest firefly species richness.

The Night walk trail recorded the highest number of adult fireflies.
Methods

• Based on the rainfall pattern in FRIM recorded from 1974-2009, the low rainfall season and high rainfall season were identified.
• Sampling of fireflies was conducted in four time periods representing high rainfall (in April and November) and low rainfall seasons (in February and June).
Same method of firefly collection was used in this study.
Seasonality study of the firefly

Results
Total monthly rainfall in FRIM (Jan-Dec 2013)

Average monthly RH in FRIM (Jan-Dec 2013)

Average monthly temperature in FRIM (Jan-Dec 2013)

Rainfall average range: 57.1 mm (Jun) - 381.0 mm (Nov)
Relative humidity average range: 81.0 % (Jun) – 89.2% (Nov)
Temperature average range: 25.6°C (Feb) – 27.4°C (May)

Source: FRIM Water Quality Program
Firefly diversity

- *Diaphanes* sp. (Sp. 1)

- *Diaphanes* sp. (Sp. 2)

- *Colophotia* sp.

- *Abscondita* sp.

- *Luciola pallescens*

- *Luciola picea*
Firefly diversity

• *Drilaster* sp.

• *Lamprigera* sp.

• *Luciola* sp. (Sp. 1)

• *Luciola* sp. (Sp. 2)

• *Diaphanes* sp.

• *Stenocladius* sp.

• Unknown larva 1

• Unknown larva 2
## Adult Firefly

<table>
<thead>
<tr>
<th>Species</th>
<th>Low Rainfall (Feb &amp; Jun)</th>
<th>High Rainfall (Apr &amp; Nov)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diaphanes sp. (Sp. 1)</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>Diaphanes sp. (Sp. 2)</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Colophotia sp.</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Abscondita sp.</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Luciola pallescens</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Luciola picea</td>
<td>7</td>
<td>57</td>
</tr>
</tbody>
</table>

## Larval Firefly

<table>
<thead>
<tr>
<th>Species</th>
<th>Low Rainfall (Feb &amp; Jun)</th>
<th>High Rainfall (Apr &amp; Nov)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilaster sp.</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Lamprigera sp.</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Luciola sp. (Sp. 1)</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Luciola sp. (Sp. 2)</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Diaphanes sp.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Stenocladius sp.</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Unknown larva 1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Unknown larva 2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Conclusion

• FRIM has a diverse firefly population.

• The abundance of fireflies in FRIM was found to be influenced by weather condition.

• Different firefly species observed to be more common during certain months.
Acknowledgement

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THANK YOU