The Seasonal Monsoon Variations and The Climatic Effects on The Abundance of Fireflies (Coleoptera: Lampyridae) At Klias River, Beaufort, Sabah, East Malaysia

ABSTRACT

Understanding the pattern of firefly abundance in an area is useful in minimizing visitors' impact on firefly populations and enhancing the quality of the firefly experience for all visitors. Implementing strategic protection guidelines greatly helps conserve species population and the chances of bioluminescent courtship behaviour in the firefly population. Klias River in Sabah, Malaysia has been listed among the top sites featuring congregating fireflies in Southeast Asia. In this study, the abundance of congregating fireflies was studied from 2006 to 2007, during the transitional monsoon (phase 1) and the northeast monsoon (phase 2) at Klias River. A total of 155 display tree stations were sampled by using a two-minute sweep netting technique, resulting in a total of 5,368 individual fireflies collected from both phases. Five species of fireflies from two genera i.e Pteroptyx and Luciola were recorded namely Pteroptyx tener (91.30%), Pteroptyx malaccae (8.53%), Pteroptyx valida, Luciola sp. 1 and Luciola sp. 2. The number of males was higher than the females in a ratio of ±7:3 on each sampling occasion. Mann-Whitney analysis [$U(n=12)=34$, $P<0.05$] indicated that the abundance of male fireflies during phase 2 was significantly higher, while the abundance of females was not significantly different in both phases [$U(n=12)=24$, $P>0.05$]. The abundance of the firefly community was significantly different from the two sampling phases [$U(n1=6, n2=6)=34$, $P<0.05$)], with the northeast monsoon season (phase 2) presenting a higher abundance of congregating fireflies. Spearman's correlation analysis showed that the mean of climate parameters i.e relative humidity (±82.52%; $P=0.779$; $r= -0.091$), rainfall (±3.84 mm; $P=0.210$; $r=0.390$), and temperature (±27.34°C; $P=0.557$; $r=0.189$) were significantly but weakly correlated with the mean of firefly abundance from the whole sampling sessions. Twelve display tree species were recorded, namely, Excoecaria indica, Heriteria littoralis, Cerbera odolam, Hibiscus tiliaceus, Ficus benjamina, Sonneratia alba, Rhizophora apiculata, Nypa fruticans, Hernandia nymphacifolia, Barringtonia racemosa, Acrostichum sp. and Acacia magnum. Heriteria littoralis (n=83) was the highest in frequency used as the display trees, but the firefly abundance was higher on Excoecaria indica (n=32) with 42% of abundance tendencies. The survival of congregating firefly species population is interconnected with the existence of certain species of mangrove trees. Identifying these display trees is important to support the protection of the natural mangrove ecosystem and the conservation of mangrove swamp tree species.