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Short Notes

Short Notes on Saproxylic Arthropods of Batu Timbang Research Station, Imbak Canyon Conservation Area

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Abstract

A sampling of saproxylic arthropods was conducted from a fallen log located close to an existing trail and was situated under shaded area. All arthropods (larvae, pupae and adults) found in the fallen log were collected and kept in vials containing 75 % ethanol solution for identification. A total of 7 insect orders and 1 class of arthropod (Diplopoda) were collected. 15 species of ants were collected but only 1 species observed residing in the fallen log. Other ants were collected foraging on the deadwood. Only one species of termites (Blattodea: Havilanditermes atripennis) was recorded. Other orders found include Coleoptera (beetles), Orthoptera (mole cricket), Dermaptera (earwig), Diptera (fly) and Lepidoptera (moth).

Keywords: saproxylic, arthropods, fallen log, Imbak Canyon Conservation Area

Introduction

In general, Arthropoda is a phylum in the Animal Kingdom where the members of this phylum have bilaterally symmetrical body, jointed chitonous exoskeleton with sclerotized plates and jointed segmental appendages (Anderson, 2001). Examples of Arthropods are insects, arachnids and crustaceans.

In the present study, saproxylic arthropods were collected in Imbak Canyon Conservation Area. Saproxylic arthropods are defined as arthropods that 'to be dependent, during some part of the life cycle, upon dead or dying wood, or wood inhabiting fungi, or upon the presence of other saproxylic species' was coined by Speight in 1989 (Grove, 2002). Many of these saproxylic faunas are arthropods which use dead wood for food, shelter, foraging or reproductive activities (Hammond, 1997; Grove, 2002). Their roles as initial dead wood decomposers thus involved directly in the nutrient cycle has made them important components in the forest ecosystem (Lachat et al., 2006).

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Arthropods play vital roles in various ecosystem functions and respond acutely to habitat manipulation. As saproxylic arthropods depend on deadwood for their survival, any alteration of vegetation and habitat disturbance will greatly affect their presence in a particular area. It has been shown that arthropods showed a fragmentation effect with point diversity and abundance negatively correlated with fragment age (Bolger et al., 2000). Despite their important role as decomposers of organic materials, very few studies have been conducted on saproxylic arthropods in tropical regions (Mahadimenakbar et al., 2008).

Material and Method

Study site

The study area is located at Batu Timbang Research Station, ICCA. Collection of Saproxylic insects was carried out from August 18th to19th, 2017.

Collections and observations

Due to limited time available (only 2 days), only one fallen log was selected as the sampling station. This fallen log was located close to an existing trail and was situated under a shaded area. The length was measured from the top to bottom of the fallen log. Diameter was measured at the top, middle and bottom sections of the log by using a measuring tape (Araya, 1992; Araya, 1993).

In the field, all arthropods (larvae, pupae and adults) found in the fallen log were collected and kept in vials containing 75 % ethanol solution for identification. Whenever possible, the fallen log was broken into smaller pieces to extract as many arthropods as possible and was examined carefully to make sure no arthropods will be left unnoticed. Extra effort was taken if the examined sections contained high number of arthropods such as ants or termites. Specimens collected were identified in laboratory. All insects were identified up to Order level, except ants and termites identified to species level. Beetles were identified to family level. Other arthropods were identified up to Class level. Excluding ants and termites, the numbers of individuals sampled in each study site were calculated. Individual numbers of ants and termites were not calculated as there were too many of them, and not all individuals were sampled. Ants that came to the rotten log foraging for food were also sampled as additional samples.

Results and Discussion

A total of 7 insect orders and 1 class of arthropod (Diplopoda) were collected, as shown in Table 1.

Table 1: Individual numbers of arthropod orders collected.

Order/ Class	No. of taxa
ymenoptera (Ants)	1. *Dinomyrmex gigas* 2. *Myrmicaria* sp. 3. *Dacetinops* sp. 4. *Pheidole* sp. 5. *Lordomyrma* sp. 6. *Camponotus* sp. 7. *Meranoplus* sp. 8. *Aenictus* sp. 9. *Leptogenys* sp. 10. *Polyrhachis* sp. 1 11. *Polyrhachis* sp. 2 12. *Diacamma* sp. 13. *Echinopla* sp. 14. *Myopias* sp. 1 15. *Myopias* sp. 2
Coleoptera (Beetles)	1. Passalidae (2 morphospecies) 2. Staphylinidae (2 morphospecies) 3. Scarabaeidae, Aphodiinae 4. Carabidae 5. Elateridae (2 larvae) 6. Cerambycidae (1 larva) 7. Curculionidae (2 larvae)
Orthoptera (Mole Cricket)	1 morphospecies
Dermaptera (Earwig)	1 morphospecies
Diptera (Fly)	1 morphospecies; 2 larvae
Lepidoptera (Moth)	1 mophospecies; 2 larvae
Diplopoda (Pill Milipede)	1 morphospecies
Isoptera (Blattodea)	1 species *Havilanditermes atripennis*

Since the collection was carried out in a short period and only a small number of specimens were sampled, we have decided not to analyze the data in detail since this will not show the true assemblage of saproxylic beetles in this area. Instead, we will only discuss generally about habitat types and beetles

associated with wood. A more reliable information would have been gained if the sampling was carried out in an appropriate period of time. Further intensive studies are needed in order to get reliable data on the diversity and composition of these beetles.

Ants use dead wood particularly as their nest, not for food. Only *Pheidole* sp. was seen making nests in the fallen log. They are not directly involved in decomposing dead wood like termites. Other ants were collected foraging on the deadwood. They might be attracted to the broken deadwood to scavenge for other invertebrates found living in the log. Termites, on the other hand, are wood decomposers. In this study, only one species of termites was recorded, *Havilanditermes atripennis*. Termites play the most important role in the process of decomposition of dead wood in Imbak Canyon. One of the characteristics of the Oriental biogeographical region is that soil-feeding termites are less prominent compared to wood-feeding species (Eggleton, 2000 in Homathevi et al., 2002).

Saproxylic beetles' association with wood can be categorized into several types of habitats as follows; (1) on bark and wood surface, (2) under bark (subcortical habitats) and (3) inside wood (wood borers) (Lawrence & Britton, 1994). In this study, the highest individual numbers were Passalidae, with 2 morphospecies, altogether 24 imagos, 8 larvae and 2 pupae. For Staphylinidae, there were 2 morphospecies collected where morphospecies 1 had 4 imagos while morphospecies 2 had only 1 imago. Other specimens in this order were in larval form.

These are all common saproxylic beetles. Beetles play a major role in decomposing dead wood since most of forest dwelling beetles use dead wood as habitat for their larvae. Passalidae and Cerambycidae larvae are xylophages which feed on wood. Staphylinidae, Carabidae (both imagos and larvae for both families) and Elateridae (larva only) are predators and they live in dead wood for predation and tend to concentrate in logs with high number of other beetle larvae.

Pill millipedes occur in moist environment, such as under logs and in leaf litter. Little is known concerning the feeding habits of these millipedes, but they most likely feed on rotting plant matters. As their name suggests, pill millipede are capable of rolling into a tight ball, presumably as a defensive mechanism (Harvey & Yen, 1989). Larvae of Diptera and Lepidoptera were also found in the log.

Diptera larvae could be fungus feeders while Lepidoptera larvae could be wood borers.

Conclusion

Deadwood play a vital role in conserving biological diversity because many organisms depend on it for their survival, or require at least one part of their life cycle on deadwood. Without deadwood, food chain of many species will be interrupted. Deadwood are also important in the nutrient cycling process through the decomposition of deadwood by microorganisms and also saproxylic arthropods. We can conclude that a fallen log can be an important microhabitat of various species of saproxylic arthropods.

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