Dear Dr,

Below are details of the proceeding for your kind information:

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14-15 March 2011
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Gunung Benom, Krau Wildlife Reserve
Geology, Biodiversity & Socio-economic Environment

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It is to inform you also that the proceedings are with the appointed printers for final adjustments and printing and scheduled to be ready by end of April 2012.

Thank you.

Regards
Hafiz ASM
AMBROSIA BEETLE (COLEOPTERA: SCOLYTIDAE) ASSEMBLAGE AT GUNUNG BENOM DIPTEROCARP FOREST

Fatmahjihan Fauzee and Fauziah Abdullah

Institute of Biological Sciences,
Faculty of Science, University of Malaya,
50603 Kuala Lumpur, Malaysia

q5fauzi@yahoo.com; fatma_nazrin@yahoo.com

ABSTRACT

A study to determine the abundance of ambrosia beetle (Coleoptera: Scolytidae) was conducted from 10th to 17th November 2009 at the dipterocarp forest of Gunung Benom, Pahang, Malaysia. Collections were made at three sites namely Lata Bujang A, Lata Bujang B and Kongsi China A total of 77 ambrosia beetles comprising of 4 species were sampled from all three sites of Gunung Benom. There was low abundance (Margalef index, 0.69) and low diversity (Shannon Weiver (Shannon-weaver) index, 0.35) of rove beetles at Gunung Benom. Four species identified are new records of ambrosia beetle for Gunung Benom. Diversity and abundance of ambrosia beetles at Gunung Benom are due to diverse habitats and availability of plenty of food for the Scolytidae.

Key words: Ambrosia beetle, Scolytidae, Abundance, Diversity, Gunung Benom
INTRODUCTION

Ambrosia beetles are from the group within the family Scolytidae, which includes many of the most important forest insect pests (Wood, 1982; Flechtmann & Berisford; 2003). Ambrosia beetles (Scolytines) which bores into the tree wood are small, cylindrical beetles, usually brownish and black in color and rarely more than 6 or 8 mm long (Borror & Delong; 2005). They have a short and geniculate antennae and usually have a large, annulated club (Borror & Delong; 2005).

Ambrosia beetles are characterized by a dependence on nutritional fungi as the chief source of food for all their developmental stages. Ambrosia beetle feed on an “ambrosial” form of fungus which is cultivated by them (Borror & Delong; 2005) on their gallery wall (Gebhart et al., 2005). They also act as a vector of diverse fungi that colonize the wood (Batra 1966; Whitney 1982; Alamouti et al. 2009). Although, Ambrosia beetle bore and drill into the wood, they do not utilize woods as their primary nutritional substrate for the ambrosia fungi is their main food source (Gebhart et al., 2005).

Ambrosia beetles attack mainly felled and/or weakened trees (Beaver, 1988; Flechtmann & Berisford; 2003). They excavate galleries in the sapwood of tree (Gebhardt et al., 2005), and spend part of their life cycle in there (Alamouti et al., 2009). This galleries and staining of wood cause damage of lumber (Flechtmann & Berisford; 2003) and decreased the market values (Graham and Boyes, 1950; Borden & McLean, 1980; Flechtmann & Berisford; 2003). Eight species of Ambrosia beetles has becomes significant pest in Eastern North America (Vandenberg et al., 2000).

Several ambrosia beetle species responded to primary attractants, odors emanating from the stressed, dying or dead host trees (Klimetzek et al., 1986; Phillips et al., 1988; Kelsey,1994; Flechtmann et al., 1995).

In Asia, dipterocarps comprises a timber species occupy a large variety of habitats (Symington 1943, Wyatt-Smith 1963, Appanah & Turnbull, 1998) from coastal to inland, riverine to swampy and to dry land, undulating to level terrain, ridges, slopes, valley bottoms, soils deeply weathered to shallow, well-drained to poorly drained, and rich to poor in nutrients.
The objective of this beetle study was to provide a checklist of ambrosia beetle (Coleoptera: Scolytidae) for the Gunung Benom, Pahang Malaysia.

**Fig. 1. Study site**

**MATERIALS AND METHOD**

**BEETLE TRAPPING**

Light trapping, pitfall trapping and interception traps (Malaise trap) were carried out from 9th to 17th November 2009 in the morning at 0800 h for 24 h. Light trapping was set up at 1700 h to 2300 h with UV 160watt mercury bulb used as a light sources powered by HONDA 200i generator to collect the beetles which was attracted to the light.
BEETLE PRESERVATION AND IDENTIFICATION

All specimens were preserved in 70% ethyl alcohol and brought back to University Malaya for drying (in the oven) and pinning process. All the beetle specimens identified using cross references with the other institution.

SCOLYTIDAE KEY IDENTIFICATION:

First segment of anterior tarsi shorter than 2nd, 3rd, and 4th combined; eye oval, emarginate, or divided; head narrower than thorax.

ECOLOGICAL INDICES CALCULATION.

Species richness and abundance of ambrosia beetle fauna were determined using Margalef index meanwhile the diversity was calculated using Shannon-Weaver index.

Margalef index, \[ H = S - 1/\ln N \]

S: the number of species recorded in a sample; with that of sample size N (Waite, 2000). Abundance increased proportionately with the value of Margalef index.
Species diversity of ambrosia beetle and the overall for ambrosia beetle was determined using Shannon-Weaver Index,

\[ H = - \sum P_i \log P_i \]

This index assumes that each species was represented in each sample and that there was random sampling of individuals from an infinitely large population. Diversity increases with the increase in the value of the index. Maximum value of Shannon-weaver index was 5.

RESULT

Table 1. Number of ambrosia beetle species, Scolytidae assembled from Gunung Benom

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
<th>No. of Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scolytidae</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>Xylocerus cordatus</em> Hag</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><em>Xylocerus affinis</em> Eichn</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><em>Poecilips ater</em> Eggers</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><em>Poecilips varabilis</em> Bees</td>
<td>71</td>
</tr>
</tbody>
</table>
Table 1 shows a summary of scolytid beetles assembled in this expedition. In total of 77 individuals of comprising of *X. affinis* (Figure 5), *X. cardatus* (Figure 6), *Poecilips ater* (Figure 7) and *P. varabilis* (Figure 8). 98.7% (N=76) individuals were sampled from pitfall and only one individual *X. cardatus* was sampled from light trap. There was low abundance (Margalef index; 0.69) and low diversity (Shannon Weiver index; 0.64) of scolytid beetles at Gunung Benom. The most abundant ambrosia beetles were sampled from Kongsi Cina (n=51) followed by Lata Bujang B (n= 11) and Lata bujang A (n=15).
Fig. 9. Percentage of Scolytidae beetle sampled by traps

Fig10. Number of Individual of Scolytidae beetle assembled based on place at Gunung Benom, Pahang
Figure 10. Margalef index of ambrosia beetle species based on places at Gunong Benom, Pahang

Figure 12. Shannon-Weaver index based on sampling places at Gunong Benom, Pahang
DISCUSSION

Scolytid beetles is an important component of the forest. This low assemblage of ambrosia beetle shows lack of dead wood present in this forest. Since Scolytids leaves in weakened trees thus low catch of scolytid indicates that many of the forest trees at Benom area is still healthy.

Park and Reid (2007) reported that, in forests unaltered by humans, the natural habitat of striped ambrosia beetle, Trypoddendron lineatum includes windthrow, snags and coarse woody debris. Ambrosia beetle also can affect our forest because it was developing the ambrosia fungi which can harm tree. Alamouti (2009), Alfaro (2007), Fraedrich (2008), Wingfield (1993) reported that ophiostomatoid fungi originally called ‘ambrosia’ species are involved in tree diseases causing loss to the wood product industry, and were considered as quarantine pests. Ambrosia beetle also important pest of forest industry (McLean, 1985; Park & Reid 2007) for it can cause damage to stored wood in millyards (Lindelow et al., 1992; Park & Reid, 2007).

Scolytidae are known to respond to primary attractants such as responding to odors emanating from the stressed, dying or dead host trees (Klimetzek et al., 1986; Phillips et al., 1988; Kelsey, 1994; Flechtmann et al., 1995, Flechtmann & Berisford, 2003). In Japan the epidemic mortality cause by the fungus transmitted by ambrosia beetle and Scolytidae were one of the most destructive pests of conifers (Wood, 1982; Flechtmann et al. 2001) not only in Brazil but some other places around the world.

With no previous study on scolytid beetles at Benom this expedition has provide new records for Benom. Regular sampling for a longer duration at several interval in a year would provide information of status of weakened trees in the area beside providing a more comprehensive check list of the area.
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REFERENCES


