Chapter IV

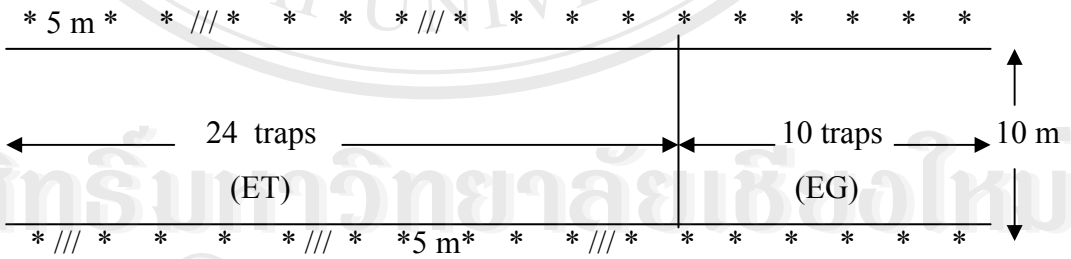
Methodology

Faunal study

Bark and ambrosia beetles were collected every 3 weeks from August 2004 – December 2005 at the two study sites (Appendices A & C). Different collections methods were used in each site.

1) Ethanol trap

Two parallel horizontal line transects (10 m apart) of 165 m length were marked in the forests. Traps at an interval of five meters were established at each site. The traps (∗) were white plastic cylindrical containers which were 8 cm in diameter and 24 cm in height; 950 cm^3 in volume (Fig. 7). Twenty- four traps were filled with 150 ml of 95% ETOH (ET) and ten traps were filled with 150 ml mixed solution (95% ETOH + Ethylene glycol (3:1)) (EG) to kill and preserve specimens. Each trap was nailed on one tree along the two horizontal line transects.



2) Flight Intercept Trap (FIT)

Five FITs (///) were divided into 2 types. Type 1) Three FITs were filled with detergent and 95% ETOH. Type 2) Two FITs were filled with mixed solution (95% ETOH +Ethylene glycol (3:1)) (Fig. 8).

ETOH baited traps in both methods were left 3 days and the traps with mixed solution were left for 3 weeks before specimens were brought back to the laboratory and identified.

3) Searching for infested logs (in mixed evergreen forest only due to infested log was unavailable in deciduous dipterocarp forest)

Beetles were removed from wood with suitable tools (saw, chisel, knife (Fig. 9)). Some infested logs were placed in white cloth sacks and the sacks were hung in the shade of greenhouse at Biology Department. A plastic tube filled with 95% ETOH was attached to the bottom of the sack (Fig. 10). The insects found in infested trees were kept in 95% ETOH.

Specimen data from 3 methods were analyzed together with climatic data (Appendix E) from Doi Pui Research Station of Kasetsart University (for MEF) and the Meteorology Department at Chiang Mai International Airport (for DDF).

Preservation and Identification

All specimens were preserved in 95% ETOH. Sorting and identification were made at the laboratory in Biology Department, Chiang Mai University. A stereoscopic microscope was used for morphological identification and a drawing tube was added for illustrations species. Identification of representative specimens were confirmed by Dr. Roger A. Beaver**.**

Figure 7 Ethanol trap

Figure 8 Flight Intercept Trap (FIT)

Figure 9 Tools

Figure 10 White cloth sack

Statistical methods

1) Diversity index

Alpha diversity describes the variety of organisms occurring in a particular place or habitat. Therefore, it is often called local diversity (Swingland, 2001). To compare community diversities, occurrence in number of samples was calculated different α – diversity of all species at a site. Two of the most common diversity indices were used: Fisher 's alpha and Simpson's.

1.1) Fisher's alpha diversity index (Fisher *et al*.,1943),

$$S = a*\ln(n+1/a)$$

When S = number of species

n = number of individuals

a = alpha diversity index

1.2) Simpson index (Simpson, 1949),

$$D = (N(N-1))/Sn(n-1)$$

when D = diversity index

S = number of species

N= total of individuals of all species counted

n = number of individuals of individual species

2) Similarity index

Sørensen index (Southwood, 1966),

$$QS = 2c / a+b$$

when c = the number of species in common

a = the number of species in sample A

b = the number of species in sample B

3) Multivariate analysis

Cluster dendrogram and species orientation made by using multivariate analysis calculated together with two independent variables; two physical factors (temperature and relative humidity) and time.

3.1) Cluster analysis

Another way of grouping similar objects in the cluster analysis (Krebs, 1989). To obtain data set, Multivariate analysis version 4.27 (McCune & Mefford, 1999) was used.

3.2) Multidimensional scaling

At present, multidimensional scaling is the recommended ordination method for community analysis. Orientation diagram of Multivariate analysis version 4.27 (McCune & Mefford, 1999) was used.

4) Accumulation curves

Taxonomic accumulation curves was produced from 17 and 20 collections in DDF and MEF respectively.

5) Trapping methods

The trap data were analyzed separately by month using analysis of variance (ANOVA). Variation in trapping methods was analyzed with one-way ANOVA.