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博士后研究工作报告

亚热带常绿阔叶林植物昆虫多样性的研究

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中文摘要

由于幼叶营养成分丰富，因此植物叶片的损失一般主要发生在叶片生长早期，故在此期间，植物上昆虫群落的研究具有重要的意义。而我国在这方面的研究相对比较缺乏。为此，本研究以福建梅花山常绿阔叶林为研究地，通过系统采样，对阔叶林中常见的 6 种寄主植物上昆虫群落组成以及多样性等方面进行了调查和研究。实验结果如下：

展叶期木荷上昆虫多样性及优势种的分布

本研究主要是在木荷展叶期间对其上昆虫群落结构和多样性时空动态进行调查，同时通过优势种生态位分析，详细探讨了昆虫在时空上的分布。实验结果表明：植食性昆虫占整个昆虫物种数的 81.68%。其中咀嚼类占 69.16%。螟蛾科、尺蛾科和叶甲科是三个主要类群。昆虫多样性指数在 1 和 3 期最高，随着叶片的成熟，指数逐渐降低。并且植食性昆虫与天敌昆虫的变化趋势不同。通过对优势种昆虫生态位宽度的分析，螟蛾 *Orthaga* sp、柑橘尺蛾 *Hyposidra talaca*、暗绿巨蝽 *Eusthenes saevus* 和叶甲 *Theopea sauteri* 是木荷上的主要食叶昆虫。随着叶片的生长，叶甲 *T. sauteri* 和茶蚜 *Toxoptera aurantii*，南北斑潜蝇 *Liriomyza huidobrensis* 和 *Elimaea* sp. 具有相似的时空分布。红点唇瓢虫 *Chilocorus kuwanae* 和彩纹猎蝽 *Euagoras plagiatus* 是木荷上主要的捕食性天敌昆虫，它们对茶蚜 *T. aurantii* 和竹节虫 *Baculum* sp. 具有很好的控制效果。本研究对确定木荷上的昆虫类群以及阐明昆虫群落与寄主植物物候的关系具有重要意义。

展叶期几种主要树种上昆虫多样性及其丰富度

本研究主要研究了六种树种上植食性昆虫的多样性和丰富度，并探讨了昆虫和寄主植物之间的寄主专一性。实验结果表明：植食性昆虫占整个昆虫物种数的 78.57%。其中咀嚼类占 82.95%。螟蛾科、尺蛾科和叶甲科是三个主要类群。其中 21 种常见种占整个物种数的 4.81%，但其数量却占总个体数的 69.96%。通过聚类分析，寄主植物上的植食性昆虫群落相似性与寄主植物亲缘关系密切相关。樟科的刨花楠，黄绒润楠和山茶科的木荷上的植食性昆虫具有相似的多样性（高多样性和均匀度），而壳斗科的三种植物：米槠，青冈和南岭栲上的昆虫多样性和优势度接近（低多样性和高优势度）。专食性和广食性昆虫在六种寄主植物上

的分布存在差异，在黄绒润楠和米楮上没有采集到广食性昆虫，常见植食性昆虫最少，分别只有 2 和 1 种。而在另外四种植物中，专食性昆虫在个体数上占优势。而从物种数来讲，木荷上的广食性昆虫占多数，而在青冈，南岭栲和刨花楠上专食性昆虫则占优势。本研究对于确定寄主植物上昆虫群落以及探讨植食性昆虫与寄主植物之间的协同进化关系具有重要作用。

关键词：昆虫群落， 生态位， 寄主植物， 展叶， 多样性， 丰富度， 木荷， 南岭栲， 米楮， 青冈， 刨花楠， 黄绒润楠

INSECT DIVERSITY IN SUBTROPICAL EVERGREEN BROAD-LEAVED FORESTS

ABSTRACT

In general, most of the foliage damage by phytophagous insects was commonly believed to be appeared in early lifespan of the foliage due to the traits of leaves. However, the insect composition in this period on the host plant was poorly studied. So during the leaf expansion , the insects on host trees were collected and classified. And the insects composition and diversity were analyzed. The study areas were situated in Meihua Mountain Natural Reserve located in southwestern Fujian province, China. And the results were provided as follows:

Insect diversity and distributions of the dominant species on *Schima superba* during leaf expansion

This research aimed to quantify the insect community structure and diversity dynamics with *Schima superba* leaf growth. Furthermore, closer examination revealed the distribution of dominant insects in temporal and spatial levels by analyzing the niches breadth and similarity. The results showed that the phytophagous insects, 81.68% of the total species, dominated the insect fauna, in which chewing insects were most prevalent (69.16% of the herbivores). Pyralidae, Geometridae and Chrysomelidae were three major families. With the leaf growth, the insect diversity indices fluctuated and had high values in period 1 and 3. After the end of leaf expansion, these indices decreased gradually. The phytophagous insects had different trends in diversity indices with the predators'. Based on the niche breaths of the dominant species, *Orthaga* sp., *Hyposidra talaca*, *Eusthenes saevus* and *Theopea sauteri* could be regarded as the major herbivores. During the leaf growth, *T. sauteri* and *Toxoptera aurantii*, *Liriomyza huidobrensis* and *Elimaea* sp. had similar distributions in the temporal and spatial levels. *Chilocorus kuwanae* and *Euagoras plagiatus*, the dominant predatory insects on the tree, had better efficacy in controlling *T. aurantii* and *Baculum* sp., respectively. This study is important in estimating local species richness, and elucidating the relationship between the insect community and

host plant phenology in broad-leaved forests.

Diversity and abundance of insects on common trees during the leaf expansion

This research aimed to quantify the insect diversity and abundance. Furthermore, closer examination revealed the distribution of host-plant specialization among the six host trees. The results showed that the phytophagous insects, 78.57% of the total species, dominated the insect fauna, in which chewing insects were most prevalent (82.95% of the herbivores). Pyralidae, Geometridae and Chrysomelidae were three major families. And 21 common species (4.81% of the total species) represented 69.96% of the whole individuals. Based on the herbivores diversity two groups could be divided. Two Lauraceae trees (*Mg* and *Mp*) and one Theaceae tree (*Ss*) had similar diversity of herbivores with high Shannon-Wiener diversity index and evenness. And the similarity of herbivores diversity was closely related with host trees. The three Fagaceae trees (*Cc*, *Cg* and *Cf*) formed the other group, which had high dominant index and low Shannon-Wiener diversity index. The distribution of specialist and generalist insects among the six study hosts was different. No generalist was collected on *Mg* and *Cc*, and the common herbivores species were the least, only 2 and 1 species, respectively. On the other four host trees, Specialist dominated in terms of the number of individuals. But when considering the number of species, the insect distribution among the four hosts was not uniform. The proportion of generalist species on *Ss* was high. However, high numbers of specialist species occurred on *Cf*, *Cg*, and *Mp*. This study is important in estimating local species richness, and understanding the co-evolution relationship between the herbivores and the host plants.

Key words: insect community, niche, host tree, leafing, diversity, abundance, *Schima superba*, *Castanopsis fordii*, *Castanopsis carlesii*, *Cyclobalanopsis glauca*, *Machilus pauhoi* and *Machilus grijsii*

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