
PLANT, FUNGI AND FOREST ECOLOGY

Antiherbivory strategy by red young leaves of rainforest tree seedlings

Abstract

Delayed greening and presence of anthocyanin provide adaptive advantages to developing young leaves. Among the many hypothetical functions of leaf reddening, its potential defensive value against herbivory was examined among seedling of *Hopea nervosa* and *Pentace laxiflora*. Herbivory was examined in green phenotypes and red phenotypes of both species based on proportion of damaged leaves and leaf area lost to herbivory. Levels of foliar damage were significantly lower for red phenotypes than for green phenotypes in *Hopea nervosa*, suggesting a successful antiherbivory strategy. In *Pentace laxiflora*, protection against insect damage was only observed in red young leaves but did not persist in matured green leaves.

Shen Nyan Leong, Wildlife Conservation Society, Malaysia

Naing Lin, Wildlife Conservation Society, Myanmar

2011

Does nectar production in *Musa beccari* show adaptations to bird pollinators?

Abstract

We studied diurnal patterns of investment of wild banana *Musa beccari* into nectar volume and sucrose concentration in male and female flowers. We also measured the final volume of nectar produced by flowers that experienced nectar removal throughout the day and flowers that did not. We found no effect of nectar removal on final volume of nectar. Volume of nectar produced by both male and female flowers declined sharply before the night, when bird pollinators are not available. Sucrose content on the first day of anthesis dropped before night in male, but not in female flowers.

Katarzyna Mikolajczak (Poland), University of Edinburgh, UK

Xaysompheng Sengkhomyong, Integrated Ecosystem & Wildlife Management Project, Lao PDR

2011

The pollination ecology of *Globba pendula* Roxb. (Zingiberaceae) in Danum Valley, Sabah, Malaysia

Abstract

The pollination of *Globba pendula* is poorly known to science. This study aims to document the fruit set variation between the opened and closed forested areas. Sixty plants were tagged, measured and observed (for 28 hours 45 minutes) in open and closed forested areas. Floral visitors were also observed on video cameras. The light density did not have any effect on the fruit set of *Globba pendula*. The number of floral visitors was highly related to the number of opened flowers and with the time of day. The study suggests that the main pollinator for *Globba pendula* could be *Anthophora* bees (Anthophoridae) regardless of whether the flower is in the open or closed forested areas.

Billy Bau, University of Papua New Guinea, Papua New Guinea

Chhin Sophea, Royal University of Phnom Penh, Cambodia

2011

Is reproductive success in *Calanthe zollingeri* (Rchb.f. 1857) related to distance from the water body and canopy openness?

Abstract

Fruit production in many orchid species is low and, as light is a key factor for terrestrial orchid distribution, we studied the influence that distance to the water and canopy openness have on the reproductive success of the terrestrial orchid *Calanthe zollingeri* in Danum Valley Field Centre. We measured attributes of the vegetative and reproductive structures of each plant as well as canopy openness and distance from the closest water source. Results show that fruit production is resource limited. Even though we could not observe any variations in pollination level due to spatial factors, the reproduction success was positively related to light availability and negatively related to distance from the water. Thus we suggest that a temporal difference in pollination success during the 2011 flowering schedule occurred.

Sophak Sett, Royal University of Phnom Penh, Cambodia

Ambra Tosto, Camerino University, Italy

2011

Ant predation and herbivore damage on *Mallotus lackeyi* (Euphorbiaceae) in a lowland dipterocarp forest in Borneo

Abstract

We did predation experiments using 600 termite baits and 200 plasticine caterpillar baits placed on 30 *Mallotus lackeyi* (Euphorbiaceae) trees with varying degree of herbivore damage. There was no statistically significant relationship between the herbivory damage and the predation rate on the termite baits. However, we found significant correlation between the herbivore damage and the rate of ant attacks on the plasticine caterpillar baits. This result suggests that the artificial plasticine caterpillars may be more suitable for assessing ant predation activity than live termites used as baits.

Hla Naing, WCS, Myanmar Program, Myanmar

Chris Dahl, New Guinea Binatung Research Centre, Papua New Guinea

2010

Different gradients and its influence to recruit of seedlings in primary forest in Danum Valley

Abstract

Seedling recruitment was examined across a topographical gradient of the lowland dipterocarp forest in the Danum Valley Field Centre. Difference between number of recruits, species, and location were tested in three sites. Eighteen sample plots were set up and seedlings were counted and identified. The results indicated that most of the new seedlings are from the dipterocarp species, accounting for 86 per cent of the total seedlings. In addition, the number of old seedlings is very small, only accounting for 4 per cent of the total seedlings. Moreover, statistical tests show that there is no difference between the number of recruits and its locations; but there is a difference in term of species and its gradient.

Ngoc Thang Nguyen, WWF Greater Mekong - Vietnam Program, Vietnam

Hoeun Seanglay, Royal University of Phnom Penh, Cambodia

2010

Do epiphytes reach the sky? A study on vertical stratification of *Asplenium* and *Drynaria* on *Parashorea* spp. in Danum Valley

Abstract

In this study, we examine whether there is vertical stratification in big epiphytic ferns of the genus *Asplenium* and *Drynaria* on *Parashorea* spp. Measuring the epiphyte occurrence on these trees together with a study on the abundance of epiphytes gives us a clear picture of how the epiphyte world looks like in the forest. The large epiphytes are mainly found in the canopy, only two were found at lower heights, less than 30 metres, on the trunks of the trees. There is a significant difference between the heights at which the *Asplenium* and the *Drynaria* grow. The *Asplenium* is not more abundant compared to the total of all other species of epiphyte in forest. However it does take up a large proportion of the present epiphyte community.

Chau Phing Ong, Massey University, New Zealand

Elis Ton, Wageningen University, the Netherlands

2010

Pollination biology and fruit dispersal of *Alocasia sarawakensis* (M.Hotta) Araceae in a lowland rainforest in Borneo

Abstract

This study investigated the reproductive ecology of *Alocasia sarawakensis* in Danum Valley Field Centre. Nothing is known about the pollination and dispersal biology of this species. Our investigation reports the first thermogenesis measurements and also observations on pollinators (Diptera, Drosophilidae). In addition unique spathe movements within this genus were recorded and are believed to act as a pollinator management device. Dispersal observations indicate that seeds of this species are exclusively dispersed by birds. A total of nine bird species were observed removing fruits, indicating *A. sarawakensis* is an important food resource for many species in lowland rainforest. Spiderhunters (Nectarinidae, Arachnothera) dominated in visitation rates and total seed removal. This may be due to the characteristic beak morphology of the genus allowing easy removal of often relatively inaccessible fruits, or possibly territorial exclusion of other species.

Conor Redmond, Trinity College Dublin, Ireland

Florian Etl, University of Vienna, Austria

2010

Seed dispersal ability of *Dryobalanops*, *Dipterocarpus*, *Shorea* and *Parashorea* of Danum Valley Field Station, Sabah

Abstract

In this study we worked on the question whether dipterocarp seeds of different species differ in their dispersal abilities. Moreover we were interested in the morphological features of the seeds which mostly determine this issue. Since we took an experimental approach as well as observations in the forest to investigate our question we also wanted to know whether our experimental based findings can be applied for natural environment. In both approaches we could find significant differences in seed dispersal among the different species. Moreover correlation tests showed that the seed

weight and wing area are mostly responsible for the flying abilities of the seeds. Comparing our two approaches we found out that general trends of dispersal ability that we gained in our experiment can also be seen in natural patterns.

Felix Steinmeyer, University of Regensburg, Germany

Sentiko Ibalim, New Guinea Binatung Research Centre, Papua New Guinea

2010

Ecology of *Pterospermum stapfianum*

Abstract

Pterospermum stapfianum is usually found growing along riverine primary lowland forest. The effect of proximity to the river and canopy cover on this plant was examined. Six plots were established along two rivers and measurements on adult tree and seedling for this species were collected. Results showed, the distribution of adult tree was related to the distance from the river. This suggested, their distribution were affected by disturbance from river, presumably flood. The density of seedlings was affected by the canopy cover, and seedlings were found in areas with less canopy cover than adult trees.

Huamei Yong, Universiti Malaysia Sabah, Malaysia

Phouthakone Luangyotha, Wildlife Conservation Society, Lao

2009

The effect of microclimate in Borneo rains forest on macrofungal communities

Abstract

Understanding the ecology of fungi is of great importance due to their relevance to questions of biodiversity and to the role they play in regulating populations of other organisms. This study was conducted in Danum Valley Conservation Area to investigate the effect of microclimate on the occurrence, density and state of host decay on the fruiting macrofungi. Macrofungi were recorded at relative humidities between 85.20 - 97.20 %; temperatures between 27.5 - 31.0 °C; and a substrate moisture content of 31.40 - 77.62 %. Different macrofungi groups showed a tendency to prefer different states of decay (measured by bark characteristics). The density of fruiting bodies was not influenced by abiotic conditions. These results suggest that further work on the succession of macrofungi on different substrates would help understand their diverse microhabitats and role in ecosystem function.

Bruno Herlander Martins, University of Lisbon, Portugal Mui

Ching Tan, Universiti Putra Malaysia, Malaysia

2009

The effect of plant density on insect herbivory in two plant species (*Melastoma malabathricum* and *Clidemia hirta*): A comparison of native and invasive species in Danum Valley Conservation Area

Abstract

The effect of plant density on insect herbivory was examined in two plant species. It was expected that with increasing density higher levels of herbivory would be sustained. A native melastome, *Melastoma malabathricum*, and *Clidemia hirta*, a non-native from the same family, were compared. Under the enemy release hypothesis any effect of density would be expected to be more severe in the

native species. Five measures of density were used in order to test which aspect of plant distribution was the best predictor of herbivory. Light availability was measured to assess the impact of growth rate. Finally herbivory types were recorded so that any differences between the two species could be analysed. There was no difference between mean herbivory levels in the two species. For *C. hirta* height provided the best model and was a significant predictor of herbivory levels showing a negative relationship. For *M. malabathricum*, volume provided the best model but none of the terms were significant. Herbivory type differed between the two species in number and frequency. These results suggest that density measures are not the best predictors of herbivory levels in *C. hirta* and *M. malabathricum* and that *C. hirta* is not becoming abundant as a result of the release from natural enemies.

Alexandra Davey, Oxford University, UK

Sebastian Kepfer Rojas, Lund University, Sweden

2009

The effect of seedling density of a shade-tolerant species, *Mallotus miquelianus* (Euphorbiaceae), on herbivory in the tropical rainforest in Danum Valley Conservation Area, Malaysia

Abstract

Mallotus miquelianus is a shade-tolerant shrub (Euphorbiaceae) which is usually found in both primary and secondary forest. This paper reports the results of a study on *M. miquelianus*. There was no relationship between seedling density and herbivory. This may be insects feeding on the plant species are generalist species. The study also showed that younger leaves exhibit more herbivory level than the mature leaves, which could be explained in terms of the nutritional value where young leaves mean higher nitrogen concentrations. Herbivory levels were not related to seedling height and the distance to the nearest neighbour. This could be because the insect types that feed on the plant are mobile and not restricted to localized feeding areas (dense seedlings). There is a significant negative relationship between the number of parent trees nearby and seedling density. Our study also showed *M. miquelianus* seedlings prefer high canopy cover compared with open canopy areas. Shaded areas may be the optimum condition where seedlings are high in number. Herbivory is influenced by a range of factors all occurring simultaneously and a better understanding of this very important concept would be to look into these various factors insect herbivores, florist composition and the abiotic factors.

Agus Wahyudi, Dipterocarp Research Centre, Indonesia

Francesca F. Dem, New Guinea Binatang Research Centre and UPNG, Papua New Guinea

2009
