

Foliar phenolics of tree communities differing in soil nutrients in Borneo

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Plant phenolic compounds have been focused as anti-herbivore defensive compounds. Phenolic production is influenced by abiotic and biotic factors (Bryant et al. 1983, Coley et al. 1985). The resource availability hypothesis (Coley et al. 1985) explains the type and amount of plant defense by interspecific variation in the trade-off between growth and defense in the light of resource availability and herbivory pressure. Coley et al. (1985) proposed that low resource availability favors plants with inherently slow growth rates, which in turn favors relatively large investment into quantitative anti-herbivore defense such as phenolic compounds. Thus, the resource availability hypothesis predicts that plant communities with high phenolic concentrations are found in infertile conditions. In this study, we elucidate whether or not this prediction is supported in Bornean tropical rain forests.

To know the interaction between soil nutrients and foliar phenolic concentrations of tree communities, we analyzed three tree communities differing in soil nutrients in Sarawak, Malaysia. Fifty trees were randomly selected from each plant community, and sun and mature leaves of them were sampled for phenolic compounds (total phenolics, condensed tannins, and lignins) analyses. Soil cores were also sampled for nutrients (mineral N and soluble P) analyses.

One-way analysis of variance (ANOVA) showed the significant differences in soil nutrient concentrations among three tree communities. Foliar total phenolic and lignin concentrations of tree communities were also different significantly among the tree communities by one-way ANOVA. However, three communities did not differ significantly in foliar concentrations of condensed tannins. We found the positive relationships between soil nutrients and total phenolics at a community level. On the other hand, there were negative relationships between soil nutrients and foliar lignins at a community level. Thus, the predictions of the resource availability hypothesis is supported for foliar total phenolics, but is not supported for foliar condensed tannins and lignins at a tree community level in tropical rain forests in Borne.

REFERENCES

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