Juvenile structure and co-existence mechanism of dipterocarps in Lambir Hills National Park

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To examine the contribution of inevitable structural trade-offs to differentiation of regeneration niche and the resultant co-existence of shade tolerant tropical tree species, structure, physiology and demography of dipterocarp juveniles were analyzed in Lambir Hills National Park, Sarawak, Malaysia. Specific questions we stated were (i) which suite of structural traits co-varies with the indices of shade tolerance? (ii) can structural traits explain difference in survival among co-occurring dipterocarps?

Structural traits were analyzed for juveniles of 18 co-occurring shade tolerant trees of genus *Shorea* (Dipterocarpaceae) and the interrelationship between the sapling structure and the regeneration strategy was discussed. The structural variation in saplings of the genus *Shorea* was as large as that found in sets of species with much more diverse origins. Results of principal component analysis showed that both crown architecture and allocation to leaves are major sources of variation in the structures of the 18 investigated species. Of these two axes, allocation to leaves was significantly correlated with wood density and showed a limited correlation with photosynthetic rate, whereas crown architecture was independent of these traits.

The environmental dependency of juvenile survival was compared among 11 co-occurring dipterocarp species to relate the demographic character to the structure. Survival of each species was modeled by logistic regression evaluated stepwise by Akaike's information criteria and the determinant structural trait was sought. The interspecific difference in survival rate seemed to be determined largely by a dependence on the light environment of smaller juveniles. Survival under low light correlated positively with root dry mass and negatively with total leaf area of juveniles.

These results suggest that these non-pioneer dipterocarp species might separate light gradient without gap to stably co-exist and allocation based trade-off partly account for this light gradient partitioning.