



Excepting parasites and a very few saprophytes, almost all plants are autotrophs - they use light energy to make their own food through the process of photosynthesis.

Consequently light, both its quality and quantity, are of huge importance to determining where and how well an individual plant can grow.

Although huge amounts of light reach the upper surface of the rain forest canopy, layers of leaves absorb or reflect light so that as little as 1% of that at the canopy reaches ground level.

Understanding the effects this has on plant growth, and the ways in which plants adapt to cope with so much shade, has been a core component of the group from the University of Cambridge working in Atherton since 1992.



Canopy architecture

Growth and development of nearly 1,000 seedlings from 54 different species has been monitored for over 10 years, showing how groups of species which can grow in shade adapt to long-term shading, though altering their canopy structure and in some cases 'foraging' for light by growing thin exploratory branches that seem to search for light flecks (Peter Grubb, Dan Metcalfe, Tim Baker).

Niche separation

Competition between seedlings is intense, as only one or two individuals will grow to maturity and fill the space left by older trees dying or being blown over.

Whilst lots of species may germinate together, subtle differences decide on which are most likely to succeed in a given spot - individual species have unique combinations of morphological and physiological flexibilities in things like leaf thickness, root morphology, biomass accumulation rates and photosynthetic rates.

They also show different responses to nutrient availability, for example, some species are able to grow on fertile soils in high light levels but not shade, though surviving in shade on infertile soils (Peter Grubb, Juliette Bloor, Dan Metcalfe).

Plant defence

Other projects carried out by the group have focussed on aspects of plant defence, including the differing susceptibility of different leaf shapes to attack by insect herbivores (with Robyn Jackson, JCU) and the role of fruit and seed defences in determining when and what can disperse different fruit types.

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