

TREE GROWTH, MORTALITY, PHYSICAL CONDITION, AND MICROSITE IN OLD-GROWTH LOWLAND TROPICAL RAIN FOREST

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Abstract. The goal of this long-term research has been to assess the relationship between annually measured tree performance and microsite conditions for nine canopy and emergent tree species in old-growth lowland tropical rain forest. The study site, the La Selva Biological Station in northeast Costa Rica, is tropical wet forest (annual mean precipitation 4 m; annual mean temperature 26°C). We used unbiased selection criteria to assemble a sample of >2000 individuals of these species in all size classes except small seedlings. We annually assessed diameter and height growth as well as stem condition and indices of crown lighting and forest structure. These data cover the period 1983–1993, and the study is ongoing as of 1999. To our knowledge the data represent the longest-running and most highly quality-controlled measurements that combine annual tree growth and mortality with associated microsite conditions in tropical forests. The data provide the most detailed insight currently available into how environmental conditions interact with past performance and ontogenetic potential in tropical rain forest trees. The focus on an annual time step allows resolution of important aspects of regeneration that are obscured or not measurable with longer inter-census intervals. The data have been used to study the nature and diversity of tropical tree life-history patterns; relationships among microsite, growth, and survival; the effects of physical damage on regeneration; ecophysiology of saplings; the ecological role of very large trees in old-growth forest; and interannual variations in tree growth.

Key words: *Costa Rica; crown position; growth variation, tropical trees; La Selva Biological Station, Costa Rica; life-history diversity; pioneers, tropical rain forest; shade tolerance; tropical rain forest tree demography and ecology.*

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