

Edaphic Characteristics and Plant Distribution
in the Bog/Wet Forest Complex of Alakai Swamp, Kauai*

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Bog vegetation in the northern Alakai Swamp was found to be well differentiated from forest vegetation floristically and structurally. Eighteen percent of vascular plant species were restricted to the bogs sampled, while 57 percent were restricted to the forest. Within the bog, the three communities distinguished floristically also differed in structure and life-form. The depauperate Prostrate Bog Community is characterized by cushion-forming graminoids and other herbaceous chamaephytes. The more diverse Dwarf Woody Bog Community is characterized primarily by herbaceous and woody chamaephytes. The Shrubby Bog/Bog Margin Community is characterized primarily by microphanerophytes and epiphytes. It has the greatest species diversity of all three bog communities, nearly three times that of the Prostrate Bog Community.

Edaphic factors were investigated in order to determine whether they might be responsible for the distribution of plant communities in this bog/forest complex. The only edaphic factors with significant differences between bog and forest rhizosphere were soil water content, total Mg, and total N. Since the rhizosphere in the open bog is extremely shallow (5 cm), competition for available rooting space may limit plant establishment and growth in the bog. The fact that available Ca, Mg, K, total Ca, and redox potential were all significantly lower below the rhizosphere suggests that these edaphic factors delimit the rhizosphere. Edaphic factors may thereby contribute to the lower stature and lower diversity of bog vegetation.

The Prostrate and Shrubby Bog Communities are better differentiated edaphically than are bog and forest. Soil water content, pH, redox potential, and total N concentration differ significantly in the two bog communities' rhizosphere. Since substrate saturation accounts for the higher pH and lower redox potential in these two communities, soil water content appears to be the primary edaphic factor affecting vegetation distribution in the Alakai Swamp bog/forest complex.

*ABSTRACT