

RESEARCH ON ECOTYPES OF METROSIDEROS

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'Ohi'a (Metrosideros) in Hawai'i has impressed many botanists for its morphological variability and its ecological amplitude. Approximately six species have been recognized from the Hawaiian Islands. Of these M. polymorpha has been considered the most widely distributed, within which approximately 23 subspecific entities have been described. They occupy habitats from sea level to 8000 ft. elevation, and from sparsely vegetated lava flows on the island of Hawai'i to forests on most of the older high Hawaiian Islands. Since taxa often occur sympatrically, and clear differences among them are obscured by intermediates, frequently workers avoid using the subspecific names, satisfied by a broad circumscription of M. polymorpha.

Present studies are now indicating that certain taxa of 'ohi'a are characteristic of particular successional phases of forest development. Physiological and anatomical attributes have been identified which account for the observed distribution of certain taxa as components of pioneer vegetation, and others as members of the older forest community within the montane rain forests on the windward slopes of the island of Hawai'i.

One of the basic environmental differences between a recent lava flow and a rain forest is water availability. Several facets of research on the water relations of Metrosideros are ongoing--including investigations of turgor maintenance, diurnal patterns of transpiration and water potential in several populations, and the study of their growth on an experimental gradient of depth to water table. Pioneer taxa have been shown to maintain turgor, and turgor-dependent processes at relative water contents low enough to restrict these functions in taxa adapted to the rain forest environment. Other preliminary results indicate pioneer taxa become established faster and have faster growth rates than the older forest taxa in a common garden experiment. Additional research will compare the drought and flooding tolerances of several taxa. The results of these studies will contribute to our understanding of the successional dynamics of the montane tropical rain forest on the island of Hawai'i.