

# Terrestrial moss, liverwort and lichen diversity across productivity gradients of southern boreal forests

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## Abstract

Terrestrial cryptogams (mosses, liverworts and lichens) provide a useful suite of species for monitoring forests, especially when species distributions and diversity attributes are well defined from benchmark sites. To facilitate this, we surveyed contrasting plant associations of upland boreal forests (in British Columbia, Canada) to explore the effects of soil fertility and substrate type on cryptogam distributions. Total terrestrial cryptogam richness of the study sites (19 plots of 0.15 ha each) was 148 taxa, with 47 mosses, 23 liverworts, and 78 lichens. Soil fertility strongly affected distribution by guild (lichen species richness declined with greater forest productivity, while moss and liverwort richness increased) and substrate (species richness on forest floor and cobbles declined with greater forest productivity as species richness increased on coarse woody debris). Generalist species comprised only 15% of the cryptogam community, and mesotrophic sites were characterized by a deficiency in species adapted to the dry-poor or moist-rich ends of the fertility spectrum. Consequently, plot diversity was lowest on mesic-Huckleberry sites, while rich-Oak fern replicates had the highest cumulative diversity. The close relationship between species composition and diversity indices of terrestrial cryptogam communities with soil fertility and associated stand attributes emphasizes the need to consider site effects in ecosystem monitoring.