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Does substrate affect the potential for establishment of boreal feather mosses after forest fire?

The rarity of boreal feather mosses for several years after a forest fire is believed to be due to their low dispersal ability and hostile environmental conditions. However, their establishment will also depend on the suitability of available substrates. Substrate chemistry, physical structure and water-holding capacity influence plant growth. After a forest fire, substrate pH can be relatively high. Low severity fires leave char on the forest floor that does not retain moisture and is nutrient-poor. Even mineral soil dries rapidly in burned sites. Forests where feather mosses are abundant have low exposure, comparatively high humidity, nutrient-containing throughfall, and an acidic humus substrate beneath the moss carpet. I compared the growth of 3 sizes of vegetative fragment (branches, shoot tips and mulch) from 2 feather mosses, Schreber's moss (*Pleurozium schreberi*) and knight's plume (*Ptilium crista-castrensis*), on 3 burned substrates (ash, burned mineral soil and burned moss) and on humus from an undisturbed stand. The initial mean pH of the substrates was: burned moss 4.3, humus 4.6, mineral soil 5.6 and ash 9.0. In a growth chamber, 12 replicates of each fragment-size/species/substrate combination were watered weekly to keep them moist. Another 12 replicates were watered bi-weekly. After 95 days in the high moisture treatment, over half of all *Pleurozium* branches had new shoots on all substrates except ash, and *Pleurozium* fragments had produced protonemata in 9 humus and 12 burned moss replicates. Only one *Ptilium* branch had new shoots. In the low moisture treatment, only *Pleurozium* fragments produced growth, and most frequently on mineral soil, which rarely dried out. These results suggest that burned substrates do not inhibit shoot production on *Pleurozium* fragments under adequate hydration. *Ptilium* fragments, however, might be less effective propagules. My research addresses outstanding question concerning post-fire succession in economically important coniferous boreal forests.