

CENTRE FOR ENHANCED FOREST MANAGEMENT



ADVANCES IN FORESTRY RESEARCH

DEPARTMENT OF RENEWABLE RESOURCES

EFM RESEARCH NOTE 07/2007



Impact of aspen litter on forest floor development in conifer dominated stands

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Feathermosses dominate the ground cover of most pure conifer stands in the boreal and montane forest zone. However, in the same geographic region and on similar site conditions, forests that have a component of deciduous broadleaf species do not develop extensive feathermoss layers. Feathermosses are known to create unfavorable conditions for forest productivity because they maintain low soil temperatures and depress decomposition and nutrient cycling. A reason for the poor development of a feathermosses layer under a deciduous broadleaf canopy may relate to the litter of deciduous tree killing the moss either by shading (smothering) or from toxins (allelochemicals) leaching from the leaf litter.



We conducted two experiments to test the impact of allelochemicals found in aspen leaf litter and the effects of aspen leaf cover on the growth of two feather moss species (*Hylocomium* or *Ptilium*). The Field experiment examined growth and mortality of feather mosses under 1) aspen leaves, 2) shade cloth equivalent to aspen leaves (providing the shading but no chemicals) and 3) or shredded aspen leaves (providing the chemicals but minimal shading). In a greenhouse experiment, we further tested the importance of the chemical leachates from aspen leaves on the growth of the feathermosses.

Findings: Aspen litter leached about 20 times as many phenolic compounds compared to pine litter. Aspen litter also leached more soluble sugars and nitrogen than the pine litter. There was higher mortality of feathermosses in artificial shade and when exposed to the chemicals leaching from the aspen litter than the control. These negative effects were additive resulting in the highest mortality in the combined shade and litter

treatment (Figure 1). The nitrogen and sugars leaching out of the aspen leaves may be helpful in keeping the feathermosses alive, but their beneficial effects did not override the negative effects of the shading or the phenolic compounds from the aspen litter.

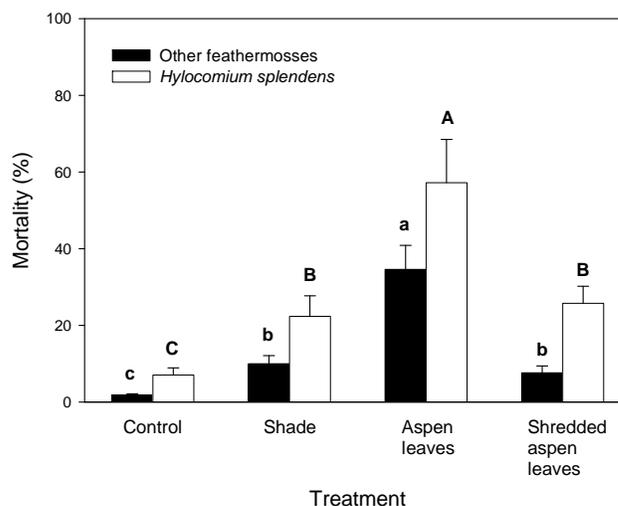


Fig. 1. Mortality of feathermosses growing in a 90-year-old even-aged pure lodgepole pine stand in response to direct shading, one layer of aspen leaves, the equivalent amount of shredded aspen leaves and an untreated control.

Implications: The leaf litter generated from a relatively small amount of aspen in conifer dominated stands will significantly slow the development of the feathermoss blanket and the development of a mor humus type in these stands. This will likely maintain soils with higher soil temperature and nutrient cycling compared to soils covered with a blanket of feathermosses. These different soil conditions could also have a significant effect on present and future site productivity.

Funding was provided by NSERC, West Fraser and Weyerhaeuser.

Further Information:

Startsev, N., Lieffers, V.J. and Landhäusser, S.M. 2007. Effects of leaf litter on the growth of boreal feathermosses: implications for forest floor development. *J. Veg. Sci.* In press,

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