Impacts of repeated fertilization on soil biota under young lodgepole pine and interior spruce stands in the interior of British Columbia
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We studied elements of the soil biota in 24-year-old lodgepole pine stands and 19-year-old interior spruce stands in central British Columbia 10 years after the initiation of annual fertilizer treatments. With pine we studied unfertilized control ON1 (650 kg N 400 kg P 400 kg K added in total plus other nutrients) and ON2 (1350 kg N 400 kg P 400 kg K plus other nutrients); with spruce unfertilized control ON1 (800 kg/ha N 350 kg/ha P 400 kg/ha K 317 kg/ha S 232 kg/ha Mg added in total plus other nutrients) and ON2 (1400 kg/ha N 350 kg/ha P 400 kg/ha K 317 kg/ha S 232 kg/ha Mg plus other nutrients). The unfertilized pine and spruce stands differed in soil fertility so fertilizer application was tailored toward specific goals for foliar nutrient contents. For soil mesofauna we determined abundance of Acari and Collembolla after high gradient extraction and for fine roots we determined ectomycorrhizal morphotypes fine root length and active and dead fine roots. In the forest floor and mineral soil under pine ON2 decreased Acari especially Oribatids and Prostigmatids relative to ON1 and unfertilized control. In contrast Collembola especially Hypogastrurids increased in ON2 relative to the other treatments. Under spruce forest floor Acari (including Oribatida and Prostigmatida) were more abundant in ON1 than the control or ON2; no differences were detected for mites in the mineral soil or Collembola in either soil horizon. Under lodgepole pine ON2 had less pine fine root length fewer ectomycorrhizal roots fewer active fine roots and more non-mycorrhizal fine roots than ON1 and the unfertilized control; Suillus sp. and Amphinema sp. disappeared from the highest fertilizer treatment while Wilcoxina sp. increased. For spruce fine root length was greater in ON1 than control or ON2 but mycorrhizal colonization and inactive roots did not differ. Amphinema sp. and Wilcoxina sp. were most abundant under ON2. These dynamic changes to the soil biota suggest both site and species explanations for the differences in responses between the pine and spruce plots to repeated fertilization.