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## Plant biodiversity linked with microbial biomass and chemical soil properties in boreal forests

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Forests plants affect the biological and chemical properties of the soil through the root exudation, input of leaf and root litter. This study investigates the relationships between the species composition of plant communities, microbial properties and content of elements of the upper soil horizon in boreal forest ecosystems (using NMS analysis).

It is hypothesized that 1) microbial biomass and chemical properties relates to the species diversity of plants, 2) microbial biomass and chemical properties relates to certain plant communities, 3) microbial biomass and chemical properties linked to altitude gradient, 4) types of communities differ due to the composition of the grass cover.

Plots were chosen in the foothills of the Ural Mountains, Russia, in Pechoro-Ilych Nature Reserve, 62-63°N, 58-59°E, to small altitude gradient 250-400 m above sea level. Plant, litter and soil were taken from five spruce - fir forests (*Picea obovate* together with *Abies sibirica*) with siberian pine and birch (hereinafter "spruce forest"). The peculiarity of the territory is that in a small area five different grassy communities were formed. They represented by both species-rich tall grasses forests and poor species, moss and large fern forests.

Types of forests: boreal-tall grass (3 plots), small grass – green moss (3 plots), bilberry-green moss (3 plots), shrub - haircap moss (4 plots) and large fern (3 plots). The plots (10×10 m) were selected for plant biodiversity describing. Topsoil samples (0-5 cm) were taken from sub-plots in July 2018 (n=48). In the collected samples, microbial biomass carbon (MBC), basal respiration (BR), pH and content of elements (S, P, Ca, Mg, K, Si, Ti, Mn) were measured.

We distinguished a group of communities with high microbial biomass (small grass-green moss and boreal-tall grass spruce forests) and a group with low microbial biomass (shrub-long moss, bilberry-green moss, large fern spruce forests). The high biological activity of the soil is weak confined to plant communities.

No strong relationship between MBC, BR, plant species richness and altitude was found.

Microbial biomass is strongly related to species of boreal-tall grasses (*Aconitum septentrionale* Koelle, *Crepis paludosa* (L.) Moench, *Rubus saxatilis* L., *Thalictrum minus* L., *Valeriana officinalis* L., *Filipendula ulmaria* (L.) common species, *Geranium* spp. *Species* L.) *albiflorum* Ledeb., Paris

quadrifolia L.). These types of grass indicate an increase in soil pH, increase the content of Ca, Mg and S in the soil, and a decrease the content of Si and Ti. Opposite, the content of Si and Ti increased in the moss communities. K increased in the soil of large fern and boreal-tall grass communities. Thus, the content of microbial biomass, S, Ca, Mg, pH increased together in the direction of boreal tall grass community. The research was financial supported by grant RFBR mol\_a No. 18-34-00987.