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Features of the Development of Macromycetes Mycelium in Forest Soils

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The effects of clearance-felling in bilberry pine forest, fertilizers in cowberry pine forest, and recreation in herb-rich birch forest on soil mycelium development and fructification of macromycetes were studied. Seasonal dynamics and distribution of macromycetes were assessed. Mycelium biomass was determined by the agar film technique. Soil samples were collected monthly from May to October. Macromycetes fruiting bodies were gathered during mass fructification.

Changes in macromycete biota in a cleared and a natural bilberry pine forest were investigated. Felling was done in the spring of 1999. In 2000 pine seedlings were planted in the plot. Mycelial biomass in the clearing soil was much lower than in the natural pine forest (336 kg/ha and 505 kg/ha, respectively). Only 6 macromycete species were observed on the clearing, whereas the nearby bilberry pine forest had more than 60 species.

Thirty-year application of nitrogen–potassium fertilizers in cowberry pine forest caused considerable changes in macromycete biota. The mycelium biomass in the control was 89% higher than in the experiment (control—246 kg/ha; experimental—130 kg/ha). Simultaneously, macromycete yield in the control was about 3.5 times lower (control—100 kg/ha; experimental—346 kg/ha). The composition of the dominant macromycete species changed. *Suillus bovinus* (L.: Fr.) Kuntze dominated the control. The nitrophilic macromycetes *Lactarius rufus* (Scop.: Fr.) Fr. and *Paxillus involutus* (Batsch: Fr.) Fr. prevailed in the experiment, but fructification of such valuable edible mushrooms as *Boletus edulis* Bull.: Fr., *Lactarius torminosus* (Schaeff.: Fr.) S. F. Gray, *Leccinum scabrum* (Bull.: Fr.) S. F. Gray, *L. versipelle* (Fr.) Shell, and so forth was suppressed.

In the herb-rich birch forest the effect of recreation on macromycetes was evaluated 3 years after intensive trampling. According to our data, re-creational load resulted in a decrease of mycelium biomass in the soil (control—169 kg/ha; experimental—138 kg/ha). However, macromycete yield in the experiment was almost 72% higher in comparison with the control (control—159 kg/ha; experimental— 274 kg/ha). Trampling down in the herb-rich birch forest stimulated fructification of *Lactarius necator* (Bull.) P. Karst., *Paxillus involutus*, and *Amanita muscaria* (L.) Hook., but fructification of *Lactarius torminosus* was reduced. The effect of trampling down on macromycetes was similar to the influence of nitrogen fertilizers. Amplification of the yield in the experiment was due to the nitrophils *Lactarius necator* and *Paxillus involutus*. This proves that damage to the living ground cover, plant roots, and macromycete fruiting bodies and mycelium from trampling down resulted in an increase in the available nitrogen in the soil.

All types of moderate anthropogenic impact studied lead to a decrease of mycelium amount in the soil. As a rule, total mushroom yield simultaneously increases. The only exceptions are extreme impacts such as clearance, resulting in elimination of ground cover and heavy damage to the soil humus horizon. At the same time, selective fellings, on the contrary, lead to intensification of mushroom fructification on the tracks of forest harvesting machines.

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