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The biotransformation of soil biocenosis by micromycetes under introduction of *Fagus sylvatica* L. to oak-hornbeam forest

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European beech (*Fagus sylvatica* L.) is a commercially valuable tree species. As the potential distribution area for beech forest is restricted by Europe, planting of artificial stands is adopted in this region. Beech introduction can alter ecosystem considerably, but the mechanism of this transformation is not clear.

We aimed to define abiotic and biotic parameters affecting floor development in beech stands introduced to the oak-hornbeam forest ecosystem ca.50 years ago in Eastern Europe (Ukraine). The daylight illuminace level was similar (2.9-6.5 klx) for both stands. However, grass cover in beech stands did not exceed 0.1-0.5 % even on sites with illuminace level 7.5-8.3 klx. It does not comply with the commonly used suggestion that shading is the main factor causes forest floor absence in the beech stands.

We indicated predominantly biotic factors influencing forest floor formation. Thus, particular edaphon represented by micromycetes was able to inhibit plants and microorganisms. We isolated *Penicillium canescens* strains from soil under beech stands. These fungi utilized beech root exudates and phenol compounds of leaf litter, and produced biologically active substances caused cytostatic and mutagenic effects. They also accelerated (in 2-3.2 times) soil β-glucosidase activity, but had no effect on phosphatase.

The biomass of fungi varied under cultivation of *Penicillium canescens* strains on Czapek medium with the addition of aqueous extracts of beech leaf litter. The biomass of micromycetes increased on 10-15 % at plant phenols concentrations up to 1 mg mL^{-1}. On the contrary, increasing the concentration of phenols up to 4 mg mL^{-1}resulted in a biomass decrease to 40%. The relationship between the concentration of plant phenols and rate of fungal biomass formation indicates that there is probably seasonal regulation of micromycetes activity in the forest biocenosis. The highest biological activity of soil fungi was observed in spring under the optimum phenol level for them.

It was found experimentally that the cellulose addition to the Czapek medium at the amount of 100 mg L^{-1} leads to an increase in the synthesis of substances with a pronounced herbicidal action. Medium- and low polar fungi metabolites (curvularin, griseofulvin, polyacetylen) significantly inhibited root growth of test plants. They provided a cytostatic effect and caused numerous irregularities in cell division (formation of chromosome bridges and micronuclei).

Thus, the introduction of *Fagus sylvatica* L. in Kyiv Polissya leads to the formation of unique environmental conditions in the forest soils. They contributed to the dominance of micromycetes (mainly genus *Penicillium*) in the soil. Soil fungi transformed leaf litter and inhibited the growth and development of plants of the lower tier by producing exudates. This led to a significant reduction in the biodiversity of the forest biocenosis.