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deciduous and their ecologically-biological
properties in sod-podzol soil of Ukraine,
North Forest-steppe; Boyarska Experimental
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Micromycetes from ramial chipped wood (RCW) of deciduous trees (*Acer platanoides*, *Acer tataricum*, *Quercus robur*) and their ecologically-biological properties in sod-podzol soil of Ukraine North Forest-steppe were studied. RCW inhabiting fungi were investigated by direct plating of chipped pieces on solid media. Isolation of soil fungi and determination of their density in soil was performed by plating soil suspensions. In total 172 micromycete species of 73 genera, 8 families, 10 orders of the sections *Oomycota*, *Zygomycota*, *Ascomycota*, *Basidiomycota* and the group of *Anamorphic fungi* were isolated and identified from 108 RCW samples and 192 samples of sod-podzol soil. Among them *Anamorphic fungi* was the most diverse group (131 species from 53 genera).

RCW samples were investigated before application and during sixteen months of incubation in sod-podzol soil. Before application 55 species from 26 genera were isolated from RCW, *Anamorphic fungi* (41 species, 74.5%) dominated with a prevalence of *Penicillium spp.* The biggest species diversity was found on RCW of *Acer tataricum* (39 species), followed by *Quercus robur* (30 species) and *Acer platanoides* (22 species). The coefficient of discrimination gave evidence that mycobiota of RCW from different deciduous trees were clearly distinct. The largest differences in species composition were observed between *Quercus robur* and *Acer platanoides* followed by *Acer tataricum*. Certain micromycetes species could be considered as typical for each type of RCW. The species mainly isolated from RCW of *Acer platanoides* were *Rhizopus arrhizus*, *Penicillium splitum*, *Doratomyces purpureofuscus*, *Phaseotalagmus cyclosporus*, and *Chaetomium globosum*. On chipped wood of *Acer tataricum* the most common species were *Penicillium wortmanii*, *Trichoderma koningii*, *Aternaria chlamydospora*, *Cladosporium macrocarpum*, and *Eidamella spinosa*, *Acrophialophora fusispora*,

Gilmaniellahumicola grisea, *Chaetomium aureum* and *Chaetomium medusarum*, were typical species fore RCW of *Quercus robur*.

Eighty one fungal species from 48 genera were identified from RCW, incubated in sod-podzol soil. *Anamorphic fungi* (55 species, 67,9%) were the most diverse group. The biggest fungal diversity was found on RCW of *Acer tataricum* (54 species) followed by *Acer platanoides* (52 species) and *Quercus robur* (49 species). Species from the genera *Alsytium*, *Cladophiadelphora*, *Cordana*, *Dactylaria*, *Gonotrichum*, *Hadrotrichum*, *Harzia*, *Hermatomyces*, *Monodictys*, *Pleurophragmium*, *Polischema*, *Selenosporella*, *Trimmatostroma* and *Veronaea* were detected on RCW after incubation in soil.

Colonization dynamics on RCW was observed during sixteen months of incubation of chipped wood in sod-podzol soil. During the first two months, the RCW samples were mainly colonized by *Rhizopus stolonifer* and *Trichoderma viride*. *Trichoderma viride* and *Doratomyces stemonitis* became dominant species on the fourth and tenth month of incubation. *Fusarium gibbosum*, *Arthrinium sphaerospermum* and *Cladosporium herbarum* were mainly isolated from RCW after twelfth months of incubation in soil. *Mycelia sterilia* (alba) and *Cladosporium herbarum* dominated on fourteenth and sixteenth month.

From soil samples a total of 119 species from 49 genera was isolated, with a domination of *Anamorphic fungi* (94 species, 79.0%). The fungal diversity in samples of untreated soil (82 species) was distinctly higher than in soil samples from plots where 200 m³ RCW /ha were applied (*Acer tataricum* - variant): 54 species, *Quercus robur*-variant 47 species; *Acer platanoides* - variant 44 species) Changes in the mycobiota of sod-podzol soil under the influence of RCW decomposition were evaluated using indexes of similarity, variety and domination.

The dynamics of micromycete density in sod-podzol soil was observed over three years. Whithin the first year after application of RCW the fungal density decreased in the *Acer platanoides* and *Acer tataricum* variants, when compared with the untreated control: 14.2 x 10³ colony forming units (CFU) g⁻¹ dry weight of soil (DW) were found in the control, 11.8 x 10³ CFU g⁻¹ DW in the *Acer platanoides* - variant and 7.6 x 10³ CFU g⁻¹ DW in soil treated with RCW from *Acer tataricum*.. Application of ramial chipped wood of *Quercus robur* to soil lead to an increase of fungal density to 15.2 x 10³ CFU g⁻¹ DW.. At the third year after application the density of micromycetes in soil was higher in all three RCW variants, when compared to the control. The highest fungal density in soil (16.4 x 10³ CFU g⁻¹ DW) was found in the *Acer platanoides* variant.

Twenty six fungal species were tested for the production of hydrolytic and oxidizing enzymes (amylase, cellulase, endo-1,4- β -xylanase, laccase, peroxidase, phenoloxidase). Enzyme activity was evaluated by color changes, clear halo or precipitation zones around fungal colonies on solid media containing the substrate of the respective enzyme. *Fusarium gibbosum* 501, *Fusarium solani*, *Fusarium moniliforme*, *Penicillium corylophyllum* 1, *Penicillium puberulum* 57, *Trichoderma harzianum* 402, *Alternaria alternata* 1801 and *Dicyma ampulifera* 302 were shown to be the most active strains in producing of studied enzymes.

The spectrum of antimicrobial activity of 38 species (41 strains) was estimated by placing filter disks soaked with their supernatant on petrie dishes which were colonized by different microorganisms, *Aspergillus spp.*, *Penicillium spp.*, *Alternaria spp.*, and *Stemphylium spp.* were most active against different groups of microorganisms

It is generally known that the application of RCW can contribute to soil improvement by changing soil structure, water balance or trophic chains. Within this study an alteration of the community of soil fungi depending on the type of RCW was demonstrated, In general, a shift to the occurrence of more saprophytic fungi could be observed. Moreover, interactions among the fungal species by different mechanisms, like the production of antimicrobial substances, may play a crucial role in establishing "new" fungal cenoses.

These results will facilitate the application of RCW, for soil improvement and will have future impact on practice researches of Boyarska forestry investigation station aiming to reforestation of Forest-steppe.

Keywords: micromycetes, ramial chipped wood (RCW), sod-podzol soil, specific diversity, taxonomy, dynamics of RCW colonization, fungi enzymes, biologically active substances among the fungal species