Crimson Publishers
Wings to the Research

Mini Review

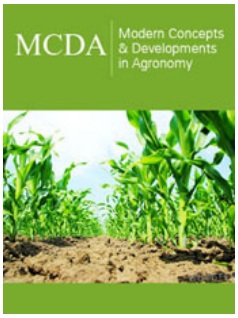
Microbiological Activity of Sod-Podzolic Soils of Various Biocenoses

LD Stakhurlova[1]* and ID Svistova[2]

[1]Voronezh State University, Russia

[2]Voronezh State Pedagogical University, Russia

ISSN: 2637-7659



***Corresponding author:** LD Stakhurlova, Voronezh State University, Russia

Submission: April 26, 2021

Published: July 08, 2021

Volume 9 - Issue 1

How to cite this article: LD Stakhurlova, ID Svistova. Microbiological Activity of Sod-Podzolic Soils of Various Biocenoses. Mod Concep Dev Agrono. 9(1). MCDA. 000704. 2021. DOI: 10.31031/MCDA.2021.09.000704

Abstract

The ecological and trophic structure of the microbial community of sod-podzolic soils was studied. Under natural herbaceous phylogeneses, the decomposition processes of mort mass are not accompanied by active nitrogen binding in microbial biomass. On arable land, the processes of mineralization of soil organic compounds are increasing. Under woody plants, a rearrangement is noted-the proportion of actinomycetes and cellulolytic that decompose litter with a high C ratio increases N, nitrogen is actively stored in the biomass of microorganisms.

Keywords: Sod-podzolic soils; Biocenoses; Fertility; Humus; Acidity; Microbial community

Opinion

In each soil type, certain groups of microorganisms develop, and a biological balance is established that is characteristic of specific conditions [1]. A factor in preserving the ecological balance of biocenoses is the maintenance of the stability of the soil cover, its ecological assessment, which includes data not only on physical, chemical, but also biological properties.

The aim of the research was to identify the features of the microbiological properties of sod-podzolic soils under various biocenoses on the example of the EC SEC of the Moscow State University "Chashnikovo" in the Moscow region.

The object of the study was low-sod and sod-podzolic soils of different degrees of podzolization and ogliness on the cover loams and clays, underlain by moraine deposits under various biocenoses (coniferous forest, mixed forest, haymaking, arable land, fallow). Generally accepted methods were used in the studies: determination of humus according to IV Tyurin, exchange bases complexometrically, pH-potentiometrically, hydrolytic acidity was determined by the Kappen method [2]. The number of groups of microorganisms was determined by sowing soil suspension on nutrient media. The structure of the microbial community was calculated from the ratio of the number of nitrogen immobilizers (N mineral medium) or oligotrophs (nitrate agar) to the number of ammonifying bacteria (N organic medium) to the number of ammonifying bacteria [3].

Sod-podzolic soils are characterized as low-humus with low cation exchange capacity. The humus content in the upper horizons of the studied samples did not exceed 4%. The washing type of water regime leads to the removal of salts from the upper part of the soil profile, promotes the release of absorbed Ca2+ and Mg2+ into the solution in exchange for hydrogen cations. Under natural biocenoses, high topical and hydrolytic acidity was revealed (Table 1). In agrocenoses, harmful soil acidity is eliminated by liming.

Table 1: Indicators of fertility of sod-podzolic soils under different biocenoses.

Option	Sample Depth, sm	Humus, %	pH	$Ca^{2+}+Mg^{2+}$	Hr
				mmol/100gr	
Coniferous forest	15-Apr	2,71	4,48	13,3	8,6
Mixed forest	17-Jun	2,69	4,70	13,2	8.3
Haymaking	17-Mar	3,27	5,60	14,5	4,4
Arable land	0-28	3,62	6,33	14,8	3,7
Deposit	16-Apr	3,34	6,52	14,0	4,2

The studied soils are characterized by low biogenicity, as evidenced by the number of ecological and trophic groups of microorganisms (Table 2).

Table 2: The number of ecological and trophic groups and indicators of the trophic structure of the microbial community of sod-podzolic soils, 106/g ab. dry soil.

Groups Microorganisms	Deposit	Mixed Forest	Coniferous Forest	Haymaking	Arable Land
	4-16sm	6-17sm	4-15sm	3-17sm	0-28sm
Ammonifiers	0,06	0,31	0,07	0,52	0,62
Immobilizers	0,03	0,40	0,42	0,45	0,34
Kimm.	0,50	1,30	6,00	0,87	0,55
Oligotrophs	0,09	0,07	0,10	0,05	0,23
Kolig.	1,50	0,20	1,40	0,10	0,40
Diazotrophs	0,20	0,14	0,20	0,15	0,12
Cellulolytics	0,05	0,15	0,21	0,04	0,02
Micromycetes	0,13	0,06	0,09	0,06	0,08
Actinomycetes	0,20	1,60	2,20	0,30	0,20

In the soils under the herbaceous vegetation, a high number of ammonifiers was detected, which indicates an intensive decomposition of organic nitrogenous compounds with a low C:N ratio. The released mineral nitrogen is poorly bound in the microbial biomass (Kimm of nitrogen below 1) and can be lost from the soil as a result of nitri-and denitrification processes. In arable soils, humus substances are also subjected to mineralization processes, as indicated by the increased number of oligotrophs. In the soil under woody vegetation, especially under coniferous forest, the number of ammonifiers decreased, which indicates a slowdown in the decomposition of plant mort mass. Fungi are mainly involved in the decomposition of organic residues of sod-podzolic soils [4]. The number of actinomycetes and cellulolytic that decompose cellulose and lignin with a high C ratio N, increases 5-10 times in the soils under the forest. At the same time, mineral nitrogen is actively fixed in the microbial biomass (Kimm of nitrogen above 1) and is stored in the soil.

Thus, the study of the structure of the microbial community makes it possible to assess the state of ecosystems and contributes to the management of microbiological processes in the soil.

References

1. Zvyagintsev DG, Babyeva IP (2004) Soil biology. p. 248.
2. Vorobyova LA (1998) Chemical analysis of soils. p. 272.
3. Zvyagintsev DG (1991) Methods of soil microbiology and biochemistry. p. 304.
4. Shcherbakov AP, Protasova NA, Belyaev AB, Stakhurlova LD (1996) Soil science with the basics of crop production. Voronezh University Publishing House, Voronezh, Russia, p. 236.