

The Role of Microorganisms in Biogenic Elements Cycling in the Dry Steppe Ecosystems of Central Asia

Lyubov' B. Buyantueva and Elena P. Nikitina

Department of Zoology & Ecology, Buryat State University, Ulan-Ude 670000, Russia,
e-mail: blb62@mail.ru, lenauude@mail.ru

Abstract

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Correspondence:

blb62@mail.ru

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The following primary variables were studied in order to understand which part microbial decomposers play in biogenic elements cycle in the steppe ecosystems of Central Asia: species composition and productivity of plant communities; chemical composition of dead plant material; fungal abundance and abundance of various ecological trophic groups of bacteria (saprophytic, proteolytic, cellulolytic); degradation rate of model substrates and plant litter (protein and cellulose). The total stock of chemical elements (*N*, *P*, *Ca*, *Mg* and *K*) involved in the biological cycles in the steppe of Buryatia (Russia) amounted from 6.478 to 10.130 kg/ha, and from 8.826 to 31.802 kg/ha in the Mongolian steppe. The chemistry of elements' cycles in the ecosystems under study is of a nitrogen type.

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Introduction

Biological cycle of chemical elements in the biosphere and in various ecosystems, and how it is disrupted by human activity are among the most topical issues of our days. Nowadays, many researchers in Russia and in other countries are looking at biological cycles in various natural ecosystems (Rodin & Bazilevich, 1965; Rodin *et al.*, 1968; Titlyanova, 1992, 1995; Titlyanova, *et al.*, 1993). However, there are very few works that take more or less close look at these processes from microbiological point of view, whilst microbiological destruction of organic matter in plant residues is an important process that determines the existence of biological cycle.

Considering insufficiency of the knowledge and the utmost importance of these ecosystems for life and agricultural activities of the indigenous people, microbiological studies of the

steppe ecosystems of Central Asia are of special academic interest.

This work primarily aimed to evaluate the rate of microbiological destruction of organic matter in the plant residues within the steppe ecosystems of Central Asia (Buryat Republic of Russia and Mongolia), as well as the total stock of chemical elements involved in the biological cycle.

Materials and methods

The investigated forb-feather-grass communities of the dry steppes were located in Buryatia and Mongolia (Fig. 1).

These communities under study were located in the Involginskiy and Mukhorshibirskiy districts of Buryatia, and in Khentii, Sukhbaatar and Dornod provinces of Mongolia. A brief