PREFACE

This book provides current research on terrestrial biomes. Chapter One demonstrates the severe conditions of arctic areas that lead to the formation of common characteristics for all complexes of soil microfungi. Chapter Two discusses plant and terrestrial microbial communities in the Alaskan tundra. Chapter Three examines spontaneous stand regeneration and herb layer restoration in post-fire woods 16 years after a forest fire. Chapter Four reviews regularities and features of differentiation and anthropogenic transformation of steppe vegetation. In Chapter Five, the capacity of combination of biomass and native microorganism for fique bagasse from farmers from a region of Colombia named Oriente Antioqueño, was studied with the objective to degrade the tetracolorisoftalonitril active ingredient.

Chapter 1 - Saprotrophic microfungi were isolated from soil samples taken at different arctic ecosystems. Distinction of soil microfungi complexes taken at Arctic is shown. In the article, it is demonstrated that severe conditions of arctic area lead to formation of common characteristics for all complexes of soil microfungi, which are different from complexes of middle latitudes.

Complexes of microfungi in the Arctic regions are characterized by latitudinal differentiation from the polar desert zone to tundra zone (sub-zone arctic, typical and southern tundra) and the tundra-forest zone.

Adaptation to arctic natural conditions take place both at the level of a system, that is at the level of microfungi complexes, and at the level of species and isolates.

The general decreases of fungal numbers have been often noted in soil along the steep gradient directed from south to north.

In the polar desert, the species number decreases compared with more southern zones due to the poorness of soil's systematic content. Microfungi complexes at the polar desert show itself at the genus and species levels rather than at the level of more large-scale systematic groups.

In soil, the dynamics and mosaics of fungi distribution depend on diversity of microclimatic conditions at their sites of existence. Anthropogenic influence causes significant changes in the complexes of soil microfungi.

In the article, it is shown that location in Arctic climatic zones and plant-geographical zones lead to appearance (formation) of different characteristics of soil microfungi complexes i.e., general number, biomass, species and kinetic structure of communities, morphological,

biochemical and functional features of microfungi, indexes of population densities and abundance of species at microfungi complexes.

Chapter 2 - The Alaskan tundra biome is a broad landscape largely distributed along the northern and western boundaries, occupying approximately 300,000 mi^2, or about one-third of the total land area (570,374 mi^2). It is part of the North American tundra biome located at latitudes 60° to 85° North and longitudes 55° to 160° West. The vegetation is largely dominated by moss, small shrubs, and some herbaceous plants. Climate change and global warming have made major impacts in Alaska. During the past 50 years, temperatures increased by an average of ~ 2.0°C, a rate that is twice the U. S. national average for the same period of time. Increasing temperatures and modest changes in precipitation have caused substantial thawing of the moss-rich permafrost, releasing massive amounts of soluble organic compounds that have accumulated over millennia in the form of frozen remains of peat moss that are deposited in strata each growing season. These soluble organic nutrients are utilized by soil microbes, thus increasing their metabolism, altering the composition of the microbial communities, and through increased respiration emitting substantially more CO_2 to the already, heavy-laden concentrations of global atmospheric CO_2. Concurrently, the ecology of Alaskan vegetation is undergoing marked changes, including transitions from largely moss and prostrate shrubs, to increasing invasion by small trees and other erect woody shrubs. Modern research techniques such as use of satellite data, experimental ecological field studies, and laboratory-based modeling and biogeochemical analyses of warming effects on plants and soil microbiota have improved the authors understanding of how climate change is affecting land plants and the soil microbial communities in the Alaskan tundra. Some current research evidence is summarized, including estimates of future effects on the environment and the consequences for human activity.

Chapter 3 - A survey of the development of the stand structure and the recovery of the herb layer in 16-year-old forests that appeared spontaneously after a forest fire was undertaken in southern Poland where the forests were burnt in 1992. Stand structure and its natural regeneration were surveyed in thinned and unthinned forests. The heights and diameters of trees were measured within each of the ten 40 x 20 m plots. In addition, ten transects (10 m long by 2 m wide, consisting of 5 quadrats, 4m^2 each) were set up in each of them. In each 2 x 2 m plot, the number of seedlings of tree and shrub species up to 0.5 m high, 0.5-2.0 m and over 2 m high that had a diameter < 5 cm were counted. The tree canopy cover was measured in each 2x2 m quadrat. Then, the herb layer composition in thinned and unthinned forests was studied. Thus, in randomly located 10x10 m plots (61 in the managed and 61 in unthinned forests), the percentage cover of herbaceous vascular plant species was estimated. Then, a numerical classification of the plots was conducted. The effect of thinning on stand composition and on the number of trees was very significant; the stand in thinned forest was exclusively composed of silver birch (density – 1,688-3,112 individuals per hectare), whereas in the unthinned forest the birch density reached 1,225-1,900 individuals per hectare and six other tree species were also present in this stand. Both forests differed in their canopy cover and the diameter of the birch trees (significantly higher in the thinned forests and lower in the unthinned forests, respectively). The response of a stand to thinning was also detectable in its regeneration process, which was more dynamic in the unthinned forest. A reaction to thinning was also noticed when the horizontal structure of the herb layer was compared. The most important difference was related to the increased level of the illumination of the forest floor within the thinned stand, which resulted in the increased

abundance of different species of grasses and sedges, as compared to the herb layer in an unthinned stand. The main conclusion is that although there is a potential to provide timber of a better quality in the case of thinned forests, the recolonization of the herb layer by true forest species is slower than in successional forests that lack any management measures of their stands.

Chapter 4 - The questions of phytobiota evolution and formation of steppes in the vast region of the south of East European plain are reviewed. The main stages, aspects and ways of flora formation under increased anthropogenic impacts on steppe ecosystems are identified. Isolation and differentiation of different flora types at the present stage of development are shown. Their structure is determined by individuality of natural and anthropogenic interaction. The classification scheme of vegetation on the ecological-phytocenotic basis is developed and the vegetation types, formation classes, formations and associations are pointed out, using the results of long-term steppe phytocenoses research. The phytocenotic diversity of steppe vegetation in the systems of dominant and floristic classifications is characterized. The floristic richness, phytocoenotic diversity, uniqueness, stenotopic features, endemism, relictness, area-marginality of syntaxons are defined in the article. Rare for the region plant communities were identified. Regularities and peculiarities of the geographic and edaphic distribution of different level syntaxons of the south of East European plain steppe vegetation were established. It is shown that flora gene pool that has been preserved over centuries in the barrows and derelict lands can be used for eco-efficiency assessment of programs for the zonal steppe vegetation reconstruction.

Chapter 5 - In recent years the Colombian productive system has been characterized by a low level of technology and a high use of inputs. This dynamic is associated with the increased use of pesticides in rural zones, which has harmful effects on the soil and water and has repercussions for human and animal health. This affects the wetland ecosystems located in high Andean mountains; as such, reducing the concentration of these substances is an environmental priority.

2,4,5,6-Tetrachloroisophthalonitrile is one of the chemical substances most commonly used as the active fungicidal ingredient in fungicides applied to fruit, vegetable and ornamental crops.

On the other hand, the solid waste derived from the fique (Furcraea andina) agroindustry is an environmental problem. The extraction of fique fiber from the plants generates solid waste that is thrown into water sources.

This research studied the fungicide biodegradation potential of activity by microorganisms isolated from fique solid waste.

The isolated strains were incubated in order to determine which ones were resistant to environments rich in Tetrachloroisophthalonitrile. The effect of these microorganisms on the biodegradation of this compound (19 g L^{-1}) was evaluated over a 3-day period, with a maximum of 99.85% degradation occurring.

The in vitro study showed that isolated and purified organisms from fique solid waste can grow in and tolerate concentrations of fungicide, efficiently degrading it. This indicates a high potential for biodegradation of other chlorate substances.