

カナダ北極におけるツンドラ生態系の植物種多様性と多機能性との関係

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Effect of plant species diversity on tundra ecosystem multifunctionality in Canadian Arctic

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Previous theoretical and experimental studies have reported that plant species diversity contribute to improvement and stability of ecosystem functions. On the other hand, in natural ecosystems, the interaction between species diversity and ecosystem functionality is little is known, because natural ecosystems which have multiple functions are fluctuating simultaneously by various species is more complex to understand.

The relationship of diversity and functions is influenced by environmental change. Therefore, to understand the alteration of the ecosystem system with the environment change, the relationship between diversity and multifunctionality in natural ecosystems can be one of the key factor. The Arctic region where are warming rapidly are concerned the change of biodiversity with environmental change, thus, the relationship of diversity and functions also is paid attention. In this study, we reported the relationship of biodiversity and multiple ecosystem functions.

Study site locate within 10 km of Whapmagoostui-Kuujuarapik (WK), Quebec, Canada (55°N). In WK where locate the northern limit of the forest, forest vegetation and tundra vegetation coexist. Our survey was conducted in the tundra vegetation area. We used line transect survey for our study. We set eight 150m lines in study site and installed 25 quadrat (1m²) in each line. We measured some soil environments, species diversity of vascular plant and ecological functions to analyzing those relationships.

As the result, there was a significant positive correlation between species diversity and multifunctionality (Fig. 2). On the other hand, there were no significant correlations between species diversity and each functions (Fig. 1). In addition, each environmental factors were able to contribute negatively or positively to multifunctionality. According to these results, The effect on ecosystem each function by species diversity is not so large enough to be detectable, however, species diversity significantly contribute to increase multifunctionality, even if we offset the effect of environment factors.

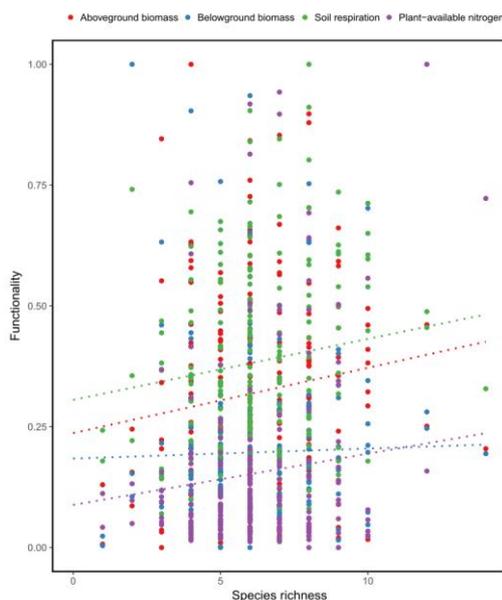


Figure 1. The relationships between species richness and each ecosystem function.

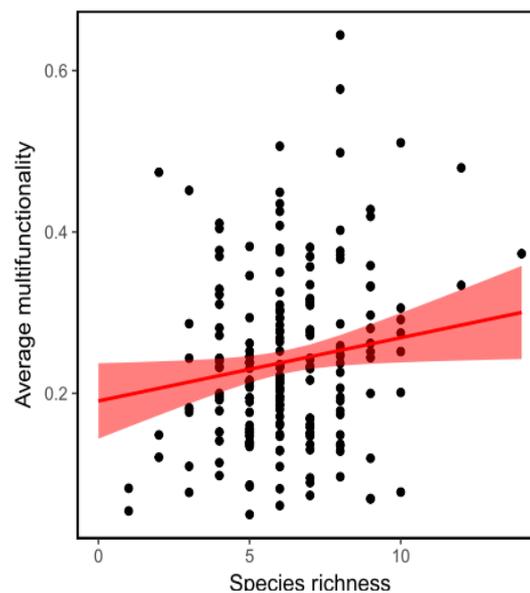


Figure 2. The relationship between species richness and averaging multifunctionality.