Environmental factors shape ammonia-oxidizer community patterns in soils from Tibetan wetlands

2 September 2020, by Zhang Nannan

Ammonia oxidation, which depends on the activity of ammonia-oxidizing archaea (AOA) and bacteria (AOB), plays essential roles in nitrogen biogeochemical cycling. While many studies have demonstrated that AOA and AOB are widely distributed and regulated by the environmental factors, less is known regarding the ammonia-oxidizer community in high-elevation wetland ecosystems.

In order to reveal the patterns of ammonia-oxidizer communities varying across geographic distances and environmental gradients, the Wetland Ecology Group, led by Prof. Liu Guihua from the Wuhan Botanical Garden, examined the AOA and AOB community compositions and diversities in soils from 31 natural wetlands across the Qinghai-Tibetan Plateau.

The results showed there was a strong heterogeneity in terms of the abundance, community and activity of ammonia oxidizers of AOA and AOB in soils from wetlands. AOA were the main ammonia oxidizers in riverine and lacustrine wetlands, while AOB dominated in palustrine wetlands. Both spatial distance and environmental variation influenced the ammonia-oxidizer communities, but the environmental conditions had a dominant role in shaping the pattern of ammonia-oxidizer communities in wetlands on the Qinghai-Tibetan Plateau.

Two climate factors, mean annual temperature (MAT) and mean annual precipitation (MAP), showed a strong impact on AOA community composition, while MAT, plant richness and more soil conditions (conductivity, pH and total nitrogen) were significantly correlated with the AOB community composition.

This study provides a considerable attempt to reveal the ammonia-oxidizer community compositions in a large-scale survey across the Qinghai-Tibetan Plateau, and these results will improve our understanding of the nitrogen cycling and will expand the ideas in management of high-elevation wetlands.

This work was supported by the National Natural Science Foundation of China, the Youth Innovation Promotion Association of the Chinese Academy of Sciences, and the Key Strategic Program of the Chinese Academy of Sciences.

The results have been published in Microorganisms in a study titled "Environmental factors, more than spatial distance, explain community structure of soil ammonia-oxidizers in wetlands on the Qinghai-Tibetan Plateau."

More information: Wen Zhou et al.

Provided by Chinese Academy of Sciences

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.