

Grazing effects on total carbon and nitrogen content of wind-eroded soils in desert steppe

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Abstract

A high stocking rate can intensify wind erosion in grasslands, and strong wind can carry away soil surface particles and their nutrients, which leads to soil barrenness. In this research, the dust flux, total carbon (TC) and total nitrogen (TN) contents and fluxes of aeolian sediment were computed in the non-growing season (mid-October to mid-April of the following year) and growing season (mid-April to mid-October) from 2018 to 2020 at a long-term grazing gradient experiment platform and wind-erosion monitoring experiment in a desert steppe in Inner Mongolia, China. The results were as follows, 1) with the increasing of stocking rate, the fluxes of aeolian sediment at 10 cm (H10), 30 cm (H30), and 100 cm (H100) were greatly increased ($P < 0.05$). Aeolian sediment fluxes followed the order control (CK) < light stocking rate (LG) < moderate stocking rate (MG) < heavy stocking rate (HG). 2) TC and TN contents of aeolian sediment reflected stocking rates and followed the order CK > LG > MG > HG, and also reflected aeolian sediment collection height, as H10P > 0.05). TC and TN contents in HG at different heights reduced by 31.1% and 25.9% on average in comparison to the CK in the non-growing season, and by 30.1% and 25.0% in the growing season. TC loss was higher than TN loss. Overall, as stocking rate increased, wind erosion increased, leading to the loss of soil nutrients and significant loss of the carbon pool in this desert steppe.

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