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REGULAR ARTICLE

Quantitative effects of wind erosion on the soil texture and soil nutrients under different vegetation coverage in a semiarid steppe of northern China

Yuchun Yan · Xiaoping Xin · Xingliang Xu · Xu Wang · Guixia Yang · Ruirui Yan · Baorui Chen

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Abstract Many studies reported the influence of wind erosion on soil degradation and the effect of vegetation coverage on preventing wind erosion. However, fewer studies have quantitatively measured the grassland soil particle size fractions and nutrients' loss caused by wind erosion under different vegetation coverage. Aims: We conducted a field experiments to (1) to explore the effect of vegetation coverage on soil wind erosion; (2) examine quantitatively the effects of wind erosion on soil texture, and determine the most erodible particles fraction of soil; (3) to examine quantitatively the soil carbon, nutrients such as nitrogen and phosphorus loss caused by wind erosion under different vegetation coverage. Methods: Six vegetation coverage treatments (0 %, 15 %, 35 %, 55 %, 75 % and 95 %) were constructed. To be able to monitor wind erosion status under more diverse weather conditions, three consecutive repeat experiments under different weather condition were conducted. Results: The results show that all the residue soil samples after wind erosion became coarser than that of original soil samples. The degree of change for the soil particle size distribution before and after wind erosion gradually increased with the less of vegetation coverage. The critical particle size for distinguishing the original soil sample and the residue soil after wind erosion occurred in the range of 125 μm and 210 μm depending on the vegetation cover. The fractions below or above the critical particle size are either easy to deplete or favoured by wind erosion, respectively. The most reduction occurs between 50 and 90 μm depending on the different weather condition and vegetation coverage. Due to the disproportionately greater amounts of nutrients in the fine soil particles, the preferential depletion of fine particles directly lead to a preferentially significant depletion of organic carbon and nutrients. The organic carbon and nutrient contents in the residue

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Y. Yan · X. Xin · X. Wang · G. Yang · R. Yan · B. Chen
Department of Grassland Sciences,
Hulunber State Station of Grassland Ecosystem
Field Observation and Scientific Research,
Beijing, China

Y. Yan
e-mail: fblwzy@163.com

Y. Yan · X. Xin · X. Wang · G. Yang · R. Yan · B. Chen
Ministry of Agriculture, Key Lab of Resources Remote
Sensing and Digital Agriculture,
Beijing, People's Republic of China

Y. Yan · X. Xin (✉) · X. Wang · G. Yang · R. Yan ·
B. Chen
Institute of Agricultural Resources and Regional Planning,
Chinese Academy of Agricultural Sciences,
Beijing 100081, China
e-mail: xxpcaas@163.com

X. Xu
Key Laboratory of Ecosystem Network Observation
and Modeling, Institute of Geographic Sciences and Natural
Resources Research, Chinese Academy Sciences,
11A, Datun Road,
Chaoyang District, Beijing 100101, China