生物土壤结皮对雨滴动能的响应及削减作用

秦宁强1,2,赵允格2**

1西北农林科技大学资源环境学院,陕西杨凌 712100;2西北农林科技大学水土保持研究所黄土高原土壤侵蚀与旱地农业国家重点实验室,陕西杨凌 712100

Responses of biological soil crust to and its relief effect on raindrop kinetic energy.

QIN Ning-qiang1,2, ZHAO Yun-ge2

1College of Resource and Environmental Sciences, Northwest A & F University, Yangling 712100, Shaanxi, China; 2State Key Laboratory of Soil Erosion and Dryland Farming on the Loess Plateau, Institute of Soil and Water Conservation, Northwest A & F University, Yangling 712100, Shaanxi, China

- 摘要
- 参考文献
- 相关文章

全文: PDF (621 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 在野外调查采样的基础上,采用单滴雨滴法研究了黄土高原水蚀风蚀交错区不同类型生物结皮对雨滴动能的响应及削减作用.结果表明:生物结皮对雨滴动能的响应与其生物组成密切相关,击穿1 cm厚浅色藻结皮和80%盖度藓结皮的累积雨滴动能分别为0.99 J和75.56 J;相同组成的生物结皮对雨滴动能的响应与其生物量有关,生物量越大,击穿生物结皮所需累积雨滴动能越大;当藻结皮叶绿素a含量(表征藻结皮生物量)从3.32 μg·g^{-1}增至3.73 μg·g^{-1}时,对应的雨滴动能则由0.99 J增至2.17 J;当藓结皮的生物量从2.03 g·dm^{-2}升至4.73 g·dm^{-2}时,其对应的雨滴动能由6.08 J增至75.56 J;生物结皮演替过程中对雨滴动能的响应呈“S”形曲线变化.不同生物量的藻结皮对雨滴动能耐受能力的差异不显著;随单位面积苔藓生物量的增加,藓结皮对雨滴动能的耐受能力显著增加.藓结皮对雨滴动能的耐受能力在生物量2.03～4.73 g·dm^{-2}之间呈线性增加;当藓结皮平均生物量达3.70 g·dm^{-2} 时,可以抗击62.03 J的雨滴动能.生物结皮对雨滴动能有显著的削弱作用,且这种削弱作用随着生物量的增加而增加.

关键词: 藻结皮 苔藓 生物量 雨滴动能 水蚀风蚀交错区

Abstract: Based on the field investigation and by the method of simulated single-drop rain, this paper studied the responses of different types of biological soil crusts (biocrusts) in the wind-water erosion interleaving region of Loess Plateau to and their relief effect on the kinetic energy of raindrops. The responses of the biocrusts to raindrop kinetic energy had close relations with their biological composition. The cyanobacteria-dominated biocrusts with a thickness of 1 cm and the moss- dominated biocrusts with the coverage of 80% could resist in 0.99 J and 75.56 J of cumulative rain drop kinetic energy, respectively, and

the potential resistance of the biocrusts with the same biological compositions was relative to the biomass of the biological compositions, *i.e.*, the larger the biomass, the higher the resistance. As the chlorophyll a content of cyanobacteria- dominated biocrusts (which characterizes the cyanobacterial biomass) increased from 3.32 to 3.73 μg·g^{-1}, the resistance of the biocrusts against the cumulative raindrop kinetic energy increased from 0.99 to 2.17 J; when the moss biomass in the moss- dominated biocrusts increased from 2.03 to 4.73 g·dm^{-2}, the resistance of the crusts increased from 6.08 to 75.56 J. During the succession of the biocrusts, their responses to the raindrop kinetic energy presented an “S” pattern. No significant differences in the resistance against raindrop cumulative kinetic energy were observed between the cyanobacteria-dominated biocrusts with variable biomass, but the resistance of moss-dominated biocrusts increased significantly as their biomass per unit area increased. The resistance of moss-dominated biocrusts increased linearly when their biomass increased from 2.03 g·dm^{-2} to 4.73 g·dm^{-2}. The moss-dominated biocrusts could resist in 62.03 J of raindrop kinetic energy when their biomass was up to 3.70 g·dm^{-2}. Biocrusts had obvious effects in relieving raindrop kinetic energy, and the relief effect increased with their increasing biomass.

Key words: cyanobacteria moss biomass raindrop kinetic energy wind-water erosion interleaving region

引用本文:

. 生物土壤结皮对雨滴动能的响应及削减作用[J]. 应用生态学报, 2011, 22(09): 2259-2264.

. Responses of biological soil crust to and its relief effect on raindrop kinetic energy.[J]. Chinese Journal of Applied Ecology, 2011, 22(09): 2259-2264.

链接本文:

http://www.cjae.net/CN/ 或 http://www.cjae.net/CN/Y2011/V22/I09/2259

没有本文参考文献

[1] 赵亮,周国逸,张德强,段洪浪,刘菊秀. **CO_2浓度升高和氮沉降对南亚热带主要乡土树种及群落生物量的影响**[J]. 应用生态学报, 2011, 22(08): 1949-1954.