

论文

半干旱黄土丘陵区人工植被深层土壤干化效应

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摘要:

科学评估不同植被恢复模式的土壤干化效应是目前黄土高原生态恢复一个亟需解决的关键问题。本文以半干旱黄土丘陵区14种典型人工植被为例,通过构建土壤水分相对亏缺指数CSWDI和样地土壤水分相对亏缺指数PCSWDI,定量评估了不同植被深层土壤干化效应。研究发现:除农地和撂荒草地外,各植被深层土壤水分均随土层深度的增加而升高,深层土壤水分含量同土层深度之间呈一元线性关系。不同人工植被深层土壤相对干化程度存在差异,以油松林地最高,杨树侧柏混交林地最低。不同植被类型受其自身蒸腾耗水、根系特征和耕作等影响,土壤干化的程度在剖面上存在差异,但总体趋势为随深度增加而降低。针阔叶植被配置模式土壤水分状况要稍好于阔叶纯林的配置模式。

关键词: 黄土高原 人工植被 植被恢复 土壤干化

Soil desiccation in deep soil layers under different vegetation types in the semi-arid loess hilly region

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Abstract:

Artificial vegetation restoration as an effective way to control serious soil erosion and improve environment conditions has taken several positive environmental effects. However, serious soil desiccation as one of negative effects also appears associated with artificial vegetation restoration lack of scientific guidance, especially in deep soil layers. To recover the fragile ecosystem of the Loess Plateau and maintain sustainable development of this region, proper artificial vegetation types should be selected based on local soil water conditions. However, methods to quantitatively evaluate soil water effect based on local rainfall and soil water conditions is urgently needed to improve, which is one of the top priorities in current research. To quantitatively evaluate the soil desiccation degree in vegetation types, 14 vegetation types were selected to analyze the eco-hydrological effect in deep soil layers in the typical semi-arid loess hilly region. Compared Soil Water Deficit Index(CSWDI) and Plot Compared Soil Water Deficit Index(PCSWDI) were induced to quantitatively analyze the soil water deficit in different vegetation types. The research showed that high-density artificial vegetation was the main reason of deep soil desiccation. Soil water contents in all vegetation types increased with soil depth except abandoned land and farmland, and had a significant linear relationship with soil depth. The degree of soil water deficit of different vegetation types was *Pinus tabulaeformis* forestland > *Pinus tabulaeformis* and *Platycladus orientalis* mixed forestland > *Armeniaca sibirica* forestland > *Caragana korshinskii* shrubland > *Medicago sativa* grassland > *Platycladus orientalis* forestland > *Amygdalus davidiana* shrubland > *Armeniaca sibirica* and *Platycladus orientalis* mixed forestland > *Populus simonii* forestland > *Populus simonii* and *Platycladus orientalis* mixed forestland. Soil desiccation various in soil profile cause for transpiration, root system characteristics and tillage management between different vegetation types. *Solanum Tuberosum* farmland, *Zea mays* farmland and abandoned land had no soil water deification compared with natural grassland. Comparisons of soil water contents in mixed forestland and pure broadleaved forestland showed that soil water condition in mixed forestland was better than that in pure broadleaved forestland. Results of this study also indicated that the CSWDI and PCSWDI were capable of reflecting conditions of soil water deficit in different soil layers and plots. They could be used as quantitative indices for soil water deficit analysis under different vegetation covers.

Keywords: Loess Plateau artificial vegetation vegetation restoration soil desiccation

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