

利用热脉冲技术研究石子覆盖对土壤内部蒸发的影响

Study of effects of gravel mulch on soil evaporation using heat pulse technology

中文关键词: [土壤蒸发](#) [石子覆盖](#) [热脉冲](#) [黄土高原](#)

Key words: [Soil evaporation](#) [Gravel mulch](#) [Heat pulse](#) [The Loess Plateau](#)

基金项目: 国家自然科学基金项目 (No.41271239和No.91025018) 资助

作者 单位

E-mail

[米美霞](#) [西北农林科技大学资源环境学院](#)

meixiami@126.com

[樊军](#) [中国科学院水利部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; 中国科学院水利部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](#)

[邵明安](#) [中国科学院水利部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; 中国科学院水利部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](#)

mashao@ms.iswc.ac.cn

中文摘要:

地表覆盖能够减少土壤蒸发, 对土壤保水、保墒有重要意义。本文基于显热平衡原理, 探究了石子覆盖对近表层土壤内部蒸发的影响。应用热脉冲技术测定的热参数和土壤温度得到土壤内部蒸发速率、显热通量、土层上下部显热通量差、潜在汽化热和显热贮藏量变化。与裸土相比, 石子覆盖以后近表层显热贮藏量无明显变化, t 检验3~9mm、15~21mm、27~33mm p 值分别为0.439、0.100和0.096, 均大于0.05, 显热通量减小, t 检验3mm、15mm、27mm p 值分别为0、0、0.005, 均小于0.05, 土层上下部显热通量差明显减小, t 检验3~9mm、15~21mm p 值均为 $0 < 0.05$, 27~33mm p 值为 $0.059 > 0.05$, 潜在汽化热增加, t 检验3~9mm、15~21mm、27~33mm p 值均为 $0 < 0.05$, 因此用于土壤蒸发的能量减小, 致使土壤蒸发速率降低, t 检验3~9mm、15~21mm p 值均为 $0 < 0.05$, 27~33mm p 值均为 $0.100 > 0.05$ 。土壤蒸发速率变化趋势与土壤显热通量差变化趋势一致: 与裸土相比, 石子覆盖以后土壤蒸发速率和土层上下部土壤显热通量差的峰值出现的时间滞后, 3~9mm、15~21mm峰值出现的时间均滞后两天。因此石子覆盖以后土壤蒸发的变化主要表现在土壤蒸发速率减小且蒸发速率峰值出现时间滞后。

英文摘要:

Mulch on soil surface can reduce soil evaporation, which is of important significance to soil water conservation. Based on the principle of sensible heat balance, effect of gravel mulch on evaporation from the near-surface soil layer was explored. Using the heat pulse technology, measurement and calculation was done of soil evaporation rate, sensible heat flux, difference in sensible heat flux between the upper and lower layers, the latent heat of vaporization, and change in sensible heat storage. Results show that the sensible heat flux and the difference in sensible heat flux between the upper layer and lower layer was lower in soil under gravel mulch than in bare soil. As compared with the latter, the former did not show much change in sensible heat storage in the near-surface soil layer, so of the 3~9mm, 15~21mm and 27~33mm soil layer, p value of the t test was 0.439, 0.100 and 0.096, respectively, all > 0.05 ; the sensible heat flux was decreasing with the p value of the t test of the soils at 3mm, 15mm and 27mm, being 0, 0 and 0.005, respectively, all < 0.05 ; the difference between the upper and lower parts of a soil layer in sensible heat flux was narrowing with the p value of the t test of the 3~9mm and 15~21mm soil layers, being both $0 < 0.05$ and of the 27~33mm soil layer, being $0.059 > 0.05$; the latent heat of vaporization was increasing with the p value of the t test of the 3~9mm, 15~21mm and 27~33mm soil layers, all being $0 < 0.05$; as the energy used for soil evaporation was decreasing, soil evaporation rate was also declining with the p value of the t test of the 3~9mm and 15~21mm soil layers being both $0 < 0.05$ and of the 27~33mm soil layer being $0.100 > 0.05$. The soil evaporation rate changed in the same way as the soil sensible heat flux did. Compared with bare soil, the gravel-mulched soil would have delayed peaks of soil evaporation rate and difference between the upper and lower parts of the soil layer in sensible heat flux. In the 3~9mm and 15~21mm soil layers, the peaks would appear 2 days later than that in the bare soil. Therefore, mulching of gravel on the land surface may affect soil evaporation, which is mainly embodied in reduction of soil evaporation rate and delay of the appearance of its peak.

米美霞, 樊军, 邵明安. 利用热脉冲技术研究石子覆盖对土壤内部蒸发的影响[J]. 土壤学报, 2013, 50(1): 75-82. Mi Meixia, Fan Jun and Shao Ming'an. Study of effects of gravel mulch on soil evaporation using heat pulse technology[J]. Acta Pedologica Sinica, 2013, 50(1): 75-82

摘要点击次数: 93

全文下载次数: 44

[查看全文](#) [查看/发表评论](#) [下载PDF阅读器](#)

关闭

您是本站第231249位访问者

Copyright©2008 土壤学报版权所有

地址：南京市北京东路71号 邮编：210008 Email:actapedo@issas.ac.cn

技术支持：北京勤云科技发展有限公司京ICP备09084417号