

## 黄土旱塬农业生态系统土壤深层水分消耗与水分生态环境效应

### Water consumption of deep soil layers and eco-environmental effects of agricultural ecosystem in the Loess Plateau

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作者	单位
樊军	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, 杨凌 712100
郝明德	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, 杨凌 712100
邵明安	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, 杨凌 712100

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中文摘要:

研究了渭北旱塬不同土地利用方式下大田土壤深层剖面含水率的变化特征, 并与长期田间定位试验结果进行比较。结果发现, 不同土地利用方式能显著影响土壤深层含水率状况, 各种方式对土壤深层水消耗能力的排序是15龄苹果园>15龄人工苜蓿>10龄苹果园>刺槐幼林>高产农田>20年撂荒地>5龄苹果园>裸地。10龄苹果园剖面剩余含水率分布接近高产农田, 而15龄苹果园土壤剩余含水率低于高产农田, 说明10龄到15龄苹果树耗水量显著增大, 超过高产农田作物消耗的水分, 导致土壤深层水分进一步消耗。由于塬面大部分耕地是高产农田与苹果园, 土壤深层含水率普遍处于较低水平。苹果树的大面积种植加快了土壤深层水分消耗, 最终可能影响这一区域的陆地水循环。

英文摘要:

Weibei upland in southern part of the Loess Plateau is a rainfed farming area where the soil water controls the water application of plants. Different plants cultivated successively for a long term may affect water contents of deep soil layers. But constant increase of agricultural productions and continual growth apple tree can lead to soil drought and form a desiccative layer below the soil surface layer, which could affect the water cycle of return into soil. This paper reported that effects of different cultivated land use patterns on deep soil water contents in the upland of the Loess Plateau and compared to the results of a long-term experiment. The main results were as following: The soil water content of bare land was highest in soil profiles, and its mean water content was 21.98%. Then, the water contents of uncultivated land and tobacco land were smaller than that in the bare land. Young acacia and ten-year apple tree consumed as same water as that of high-yield field, furthermore, fifteen-year apple tree and artificial alfalfa used much more water than that of high-yield crops. The apple tree consumed a great quantity of water from the deeper soil layers, which could lead to the desiccation of soil. Because most fields are high-yield field and apple orchard on the Weibei upland, their average soil water content of deep layers were 12%~14%. That a large number of apple tree planted will result in the desiccation of field soils on the upland, which will affect the water cycle in this area.

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服务热线: 010-65929451 传真: 010-65929451 邮编: 100026 Email: tcsae@tcsae.org

