

黄土高原地区不同草地退耕模式水分利用效率的比较

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摘要 研究了半干旱黄土高原区不同退耕模式下植被恢复的比较, 对3种不同人工豆科牧草多年生紫花苜蓿alfalfa (*Medicago sativa*)、多年生沙打旺erect milkvetch (*Astragalus adsurgens*)、2年生草木樨sweetclover (*Melilotus officinalis*)和一种自然撂荒 (fallow) 进行了实地种植比较。通过3a研究发现: 紫花苜蓿是耗水最严重的牧草, 水分利用效率仅高于撂荒; 沙打旺具有最高的地上总生物量和水分利用效率。紫花苜蓿和沙打旺地块中杂草生物量逐年降低, 物种数量最低且没有增加。2年生草木樨地物种数和地上生物量逐年增高, 草木樨对暴雨的入渗贮存能力最大, 显著高于自然撂荒。草木樨结束生活史后第1年地上总生物量(和撂荒一样全为杂草)是撂荒地的两倍, 且略高于紫花苜蓿的地上总生物量, 同时物种数量也和物种数目最多的撂荒地没有显著差异 ($p < 0.05$)。草木樨显著降低了10~40cm土壤剖面的容重, 草木樨结束生活史后残留根系有助于深层土壤水分恢复, 水分状况恢复良好且优于紫花苜蓿和沙打旺。可见短期的人工干扰下两年生草木樨的种植有利于促进自然植被的恢复, 优于自然撂荒和其他牧草种植的方式, 容易推广且实际可行。

关键词 黄土高原; 退耕地; 植被恢复; 人工短期干预

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Comparisons of water use efficiency under different conversion models of cropland to grassland in the Loess Plateau of China

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Abstract This study was conducted to explore the ecological restoration effects of the different conversion models of cropland to grassland in the semiarid Loess Plateau of China. One natural vegetation recovery model, the fallow (Fa), and three human short-term grass-seeding perturbation models are investigated. The three perturbation models include perennial legume grass of alfalfa *Medicago sativa* (Ms), two-year life history legume grass of sweetclover *Melilotus officinalis* (Mo) and perennial legume grass of erect milkvetch *Astragalus adsurgens* (Aa). All the plots were to recover naturally and were enclosed to avoid grazing and harvesting. The experiments were continued for 3 years. The Mo significantly decreased soil bulk density and facilitated the following wild weed vegetation growth and species recovery after Mo finished its life history. The wild weed biomass and water use efficiency (WUE) of Mo in the first year after its life history finished were twice as much as that of Fa. The Mo also has the highest water recharge efficiency during rainfall events, especially in storms at growing stage. The remained Mo root system facilitated the soil moisture recovery in deep soil. WUE in the Mo was higher than that in Fa and Ms, but it is lower than that in Aa. The Ms has the worst soil moisture condition in deep soil. Wild weed biomass decreased yearly and species has no change in Ms and Aa. It was found that Fa has the best soil water condition but the worst WUE and the lowest aboveground biomass. Therefore, app

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ropriate short-term human perturbation of Mo has positive effects on the vegetation recovery efficiency and was easy to be applied to a large area in the semiarid region of Loess Plateau.

Key words [Loess Plateau](#) _ [abandoned cropland](#) _ [vegetation recovery](#) _ [short-term human perturbation](#)

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