



The Application Rate Influences the Soil and Water Conservation Effectiveness of Mulching with Chipped Branches

Daili Pan, Xining Zhao, Pute Wu, and Xiaodong Gao

Northwest A&F University, Soil and Water Conservation, China (pandaili.geoscience@foxmail.com; zxn@nwafu.edu.cn)

Mulching with chipped, pruned branches (MB) is an effective land management practice to reduce surface runoff and control soil water erosion. MB has extra advantages such as material availability and low cost compared with other mulching materials, especially in orchards. To evaluate the impacts of application rates on the ecological and economical effectiveness of MB, a plot-scale soil bin experiment was conducted under two representative rainfall regimes. Five treatments with different MB application rates were tested: clear cultivation (CC), namely: bare soil without mulching, 0.37 kg m⁻² (MB1), 0.74 kg m⁻² (MB2), 1.11 kg m⁻² (MB3), and 1.48 kg m⁻² (MB4). Application of MB reduced runoff generation by 15.5% to 78.6% and sediment yield by 40.7% to 98.6% compared to CC. From an ecological view, soil and water conservation performance of MB generally decreased with increasing rainfall intensity and application rate with an exception of MB4 at the heavy rainfall. Different mechanisms, such as soil surface coverage, rainfall interception by mulching, soil permeability, stability of mulching materials, and rill initiation simultaneously affected the effectiveness of MB. From an economical view, this relationship was more complex. The present study confirmed the necessity of determining the proper mulching application rate in the context of site-specific soil, vegetation, and climatic conditions as well as local social status.