

Public Abstract

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Title:Agroforestry and Grass Buffers for Improving Soil Hydraulic Properties and Reducing Runoff and Sediment Losses from Grazed Pastures

Agroforestry buffers have been proposed as a conservation practice in watersheds for improving water quality. Differences in soil hydraulic properties, soil pore properties, and root growth parameters were evaluated within buffers (agroforestry and grass) and grazed pastures (rotationally grazed and continuously grazed) on deep loess soils in Central Missouri. A hydrologic model simulation study was performed to evaluate the effects of buffer thickness and cattle stocking density on runoff. Cattle grazing increased soil density and decreased soil water conductivity compared to buffer areas. Ungrazed buffer areas had improved soil hydraulic properties relative to pasture areas. These buffers had lower soil density, higher soil porosity, and higher water infiltration. Roots in buffer areas had higher root length density and higher root carbon which enhanced soil carbon. This increased soil carbon probably improved soil hydraulic properties within buffer areas compared to pasture areas. Measured runoff and sediment losses from small watersheds were lower with agroforestry buffers compared to no buffer. Model simulation results showed that buffer width and cattle stocking density influenced runoff. Runoff decreased with double the buffer width compared to the measured buffer width. In contrast, runoff increased with double the cattle stocking density compared to the measured cattle stocking density. Results from this research showed that buffers should be kept undisturbed by cattle with fences around buffer areas to maintain and enhance soil hydraulic properties. These buffers should be installed downslope from grazed pasture areas to reduce runoff and sediment losses, and to improve water quality.