271-2 Tillage, Residue, and Crop Rotation Effects On Rain Infiltration and Sediment Transport.

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Increased precipitation storage as soil water is crucial to dryland production of wheat (*Triticum aestivum* L.) and grain sorghum [*Sorghum bicolor* (L.) Moench] on the semiarid Southern Great Plains. At the USDA-ARS, Conservation and Production Res. Lab., Bushland, TX (35° 11′ N, 102° 5′ W), runoff of rain from a Pullman clay loam (fine, mixed, superactive, thermic Torrertic Paleustoll) is typically less with stubble-mulch (SM) tillage than for no-tillage (NT) of either continuous wheat (CW) or wheat grown in rotation with grain sorghum and an intervening fallow (WSF). Our objective was to quantify tillage and residue effects on selected soil properties, infiltration of simulated rain, and related sediment transport for long-term CW and WSF rotation plots. Water was applied with a rotating disk rainfall simulator to 3 replicates of all possible tillage (SM and NT) and rotation (CW and WSF) combinations with wheat residue retained or removed. Compared with bare soil, wheat straw residue cover increased cumulative rain infiltration at 60 minutes > 25 mm across all tillage and rotation combinations and also decreased soil loss. Rain infiltration and total soil loss did not vary significantly with NT and SM tillage treatments. The CW rotation typically increased infiltration regardless of residue cover or tillage compared with the WSF rotation, probably due to greater aggregate stability. We conclude that residue cover significantly increases rain infiltration over any of our tested bare soil tillage and rotation treatment combinations. Nevertheless, we observed a lower rain infiltration rate at 60 minutes under no-tillage residue management than where stubble-mulch tillage disturbed the soil.
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