341-13 Monitoring near Surface Soil Water and Associated Dynamics of Infiltration and Evaporation Fluxes.

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In-situ monitoring of soil water has the advantage of integrating the precipitation and evaporation history and gradual changes in hydraulic properties on the aggregate response of the soil-plant-atmosphere system. A paired field study in Bushland, TX and Tribune, KS evaluated infiltration and evaporation throughout a wheat-sorghum-fallow rotation under no-tillage (NT) and stubble-mulch tillage (ST) management. Near-surface (0.1 – 0.3 m) hourly soil water contents were measured at each location using time-domain reflectometry. Profile water contents were also monitored weekly using a neutron probe. Soil temperature, precipitation and solar radiation were also measured. Cumulative infiltration and evaporation were estimated using a water balance approach in conjunction with a calibrated drainage model. At both locations, soil water contents at 0.05 and 0.1 m were lower in recently tilled ST plots, even following repeated precipitation events. During fallow after wheat in Bushland, NT resulted in an additional 13 mm of soil water storage near the surface compared with ST. However, prior to sorghum emergence and during early vegetative stages, cumulative infiltration was greater under ST, which narrowed differences in stored soil water to 7 mm. During fallow after sorghum in Bushland, no-tillage did not influence cumulative infiltration and evaporation and, consequently, did not exhibit significantly improved water storage despite having greater residue cover. During fallow after wheat in Tribune, NT resulted in an additional 25 mm of storage compared with ST. Moreover, prior to sorghum emergence and during early vegetative stages, cumulative infiltration was 37 mm greater under NT compared with ST during this time period and resulted in 60 mm of stored water available for crop use compared with ST. The hydrologic response to tillage practices substantially differs at each location and this influences sorghum yield potential and profitable dryland cropping management practices at each location.

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