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## Soil moisture dynamics under *Caragana korshinskii* shrubs of different ages in Wuzhai County on the Loess Plateau, China

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Soil moisture is a key factor affecting vegetation growth and survival in arid and semi-arid regions. Knowledge of deep soil moisture dynamics is very important for guiding vegetation restoration and for improving land management practices on the water-limited Loess Plateau. Temporal changes and vertical variations in deep soil moisture (at soil depths of 0–600 cm) combined with soil moisture availability were monitored in situ under *Caragana korshinskii* shrubs of different ages (named CK-10a, CK-20a and CK-35a) in the Loess hilly region during the growing season of 2013. The soil moisture content (SMC) under *C. korshinskii* shrubs of different ages was highly consistent with the seasonal precipitation variations and generally decreased as follows: CK-10a > CK-20a > abandoned land > CK-35a. The SMC varied greatly over time during the growing season ( $P < 0.01$ ), decreasing from April to May and then slowly increasing with some fluctuation from June to October. The SMC drastically decreased with depth from 0–300 cm and then gradually increased with some fluctuation from 300–600 cm. A critical turning point and transition zone connecting the shallow and deep soil moisture occurred at 200–300 cm. Therefore, the soil profile was divided into active, secondary active and relatively steady soil layers in terms of soil moisture. The SMC fluctuated at depths of 0–100 cm and 300–400 cm and was relatively stable in the deeper soil layers. The amount of available soil moisture gradually decreased as the forest stand age increased, especially at CK-35a, where most of the soil moisture was unavailable for plant use. In addition, our study indicates that a large-scale restoration strategy with pure shrubland or woodland may not be suitable for soil moisture recovery in arid environments.