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Effects of Mattic Epipedon on Surface Soil Hydraulic Properties of Alpine Meadow Soil

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Alpine meadow soil is an important ecosystem component of the Tibetan Plateau. Existence of mattic epipedon in the alpine meadow soil surface changes soil physicochemical characteristics hence can affects soil hydraulic properties. Field survey was conducted in contrastive plots with and without mattic epipedon surface in Naqu, northern of the Tibetan plateau, to evaluate the effects of mattic epipedon on the ability of soil water storage, soil water infiltration and surface evapotranspiration. Results shows that comparing with the bare surface, the mattic epipedon surface has lowered about 25% of the saturated soil water content at 0-20 cm depths, but increases about 20% of the soil water storage at 20-60 cm depths. Besides, the mattic epipedon can decrease 80% of the surface soil infiltration rate and reduce 40% of the water moving downwards beyond 100 cm depths. Moreover, the mattic epipedon surface can almost double the maximum evapotranspiration rate compared to the bare surface evaporation. On the whole, the mattic epipedon enables soil to retain more water in shallow layers after precipitation event. This is benefit to biology activities of the earth surface. The abundant and compact root system in mattic epipedon is considered as the principal influence factor. This study is helpful for improved water flow modeling in alpine meadow soil and provides guidelines for predicting changes in alpine meadow ecosystems with grassland degradation.

Keywords: Alpine meadow soil; mattic epipedon; soil hydraulic properties; the Tibetan Plateau.