

The effect of gravel-sand mulch on soil moisture in the semi-arid loess region

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Abstract In the semi-arid loess region of northwest China, the use of gravel and sand as mulch has been an indigenous farming technique for crop production for over 300 years. This study was carried out to quantify the effect of gravel-sand mulch on soil water in the semi-arid loess region of northwest China using HYDRUS-1D code. The field experiment (4 April 2001–12 July 2001) consisted of two treatments: no mulching as a control and gravel-sand mulching. The results show that the gravel-sand mulch field can provide a more favorable soil moisture environment for plant growth. In the initial stage of watermelon growth, there was higher soil water content in the gravel-sand mulch field, which was very beneficial to the germination of watermelon. Gravel-sand mulch can improve soil moisture conditions. It is effective in reducing evaporation and improving transpiration. Gravel-sand mulch can improve the infiltration of rainwater to depth. After a little rainfall, the soil moisture gathered at 12–30 cm depth soil layer for the gravel-sand mulch field and at 0–20 cm depth soil layer for the no-mulch field. The results indicated that the higher soil moisture content in the layer (12–30 cm) may enhance watermelon growth.

Key words gravel-sand mulching; HYDRUS-1D; northwest China; semi-arid; soil moisture movement