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Assessment of enhanced infiltration by artificial macropore with HYDRUS-2D

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Soil is largest carbon storage body in all terrestrial medium such as vegetation and the atmosphere. However, these days, soils could not show its function as water storage layer or culture medium for plant, because of climate change or rough management. In this study, artificial macropores are introduced in soils for purposing enhancing infiltration without cultivation. If soils are degraded and poor in organic matter, sometimes surgace crust would be created after the heavy rain, in this situation, soil surface structure could greatly influence on rainwater infiltration. Thus artificial macropores were created for degraded soils to enhance infiltration. Artificial macropore is a vertical tubular hole with fibrous materials inside. Fibrous material allow enhancing vertical infiltration while maintaining its. In the experiment, HYDRUS-2D was used to reproduce artificial macropore effect on vertical infiltration along with surface runoff. Macropores were open to the soil surface while drawing surface runoff water simultaneously. However, HYDRUS-2D can not calculate surface runoff on the soil. In order to calculate surface runoff, we configured virtual space set with high saturated water content and high hydraulic conductivity within the calculating domain. The virtual space was assumed as virtual-air. We conducted computer simulations along with actual experiment using same conditions such as soil texture, rainfall intensity and artificial macropore. In the result, surface runoff and inflow into artificial macropore were accurately described by configuring virtual-air. The above results would allow us to reproduce the effect of artificial macropore to enhance infiltration in HYDRUS-2D with virtual-air.