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Investigating the Performance of Gravel and Synthetic Envelopes in Subsurface Drainage

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Abstract

In this research, the hydraulic behavior of two kinds of envelopes including synthetic envelope, PP450 and gravel envelope with USBR standard in two soil tank models with silty loam texture was investigated. Three water heads including 55, 75 and 105 cm (water logging) from drain level were used. The discharge of pipe drain in the steady state condition for gravel envelope and at 55, 75 and 105 cm water heads was 188.9, 172.0 and 897.0% more than those in PP450, respectively. Envelope hydraulic conductivity rates at gravel envelope for 55, 75 and 105 cm water heads were 24.6, 14.0 and 21.2 times higher than those in PP450, respectively, and gradient ratios in these water heads for gravel envelope were 14.5%, 2.8% and 14.2% lower than those for synthetic envelope. There were also different behaviors in the two kinds of envelopes for hydraulic conductivity and entrance resistance of pipe and envelope in 55 and 75 cm water heads relative to 105 cm. In general, according to the measured parameters in this research, gravel envelope showed a better performance.

Keywords: Water head, Gradient ratio, Entrance resistance, Soil tank, Drainage.

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