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A simple method for estimating long term acceptance rates in OWMSs

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Abstract Text:

Estimates of how much wastewater infiltrates the soil via the trench sidewall and bottom are needed to design on-site wastewater management systems (OWMSs) based on their long term acceptance rate (LTAR). In earlier work, we found that simple equations developed by Bouma for bottom and sidewall fluxes agreed well with a two-dimensional numerical computer model (HYDRUS-2D) for the case of a deep water table. In this study we examined the effect of a shallow water table beneath the trench bottom. We did this for 12 different soil textural classes to represent a full range of soils (hydraulic properties were taken from a soil database). Biomat saturated hydraulic conductivity (0.073 cm/d) and thickness (0.6 cm) were based on an earlier study. Despite the wide range in saturated hydraulic conductivities of the soil textural classes (8.18 to 642.98 cm/d), the steady flow through the bottom of the trench in these soils calculated by HYDRUS-2D fell in a narrow range of 4.44 to 8.05 cm/d. Bouma's method for predicting flow through the trench bottom and sidewall produced remarkably accurate estimates for all soil textural classes except the silt which had the highest flux. These simple equations can be used to estimate LTAR for a wide range of soils, even with a shallow water table, but a correction factor needs to be used for soils with the highest flux.

Impact Statement:

A simple method for estimating LTAR will provide a more scientific basis for determining the minimum trench length required in different soils. This should help prevent failure of OWMSs and improve water quality.