Drainage Rate Calculator

https://transformingdrainage.org/tools/drainage-rate/

Overview

This tool calculates the three standard coefficients (drainage rates) recommended by Skaggs (2017) for characterizing the hydraulics of subsurface drainage systems.

Drainage Intensity represents the steady state drainage rate when the water table midway between parallel drains is at the soil surface. It is a measure of the rate at which water can move through the soil to the drains.

Drainage Coefficient quantifies the hydraulic capacity of the drainage system. This value is the rate that the outlet works can remove water from the site.

Kirkham Coefficient is the steady subsurface drainage rate corresponding to a saturated soil profile with a shallow ponded surface.

How the tool can be used

The tool can be used by a variety of users to answer a range of different questions, for example:

Drainage contractors and engineers can use the tool when designing and evaluating drainage systems to match drainage coefficients with drainage intensities.

Drainage researchers can use it to quantify key subsurface drainage rates for reporting drainage system hydraulic characteristics of study sites in a standard way.

Educators can use it with students to calculate drainage rates for different conditions to explore the impacts of soils, hydraulics, and drainage system characteristics on drainage rates.

For More Information

This tool is freely available at https://analytics.iasoybeans.com/cool-apps/TD_DrainageCalculators/.

How it works

Drainage Intensity (in/day or cm/day) is calculated by the Hooghoudt equation and is dependent on the effective saturated hydraulic conductivity of the soil profile, drain depth and spacing, effective radius of the drain, and equivalent depth to the restrictive layer.

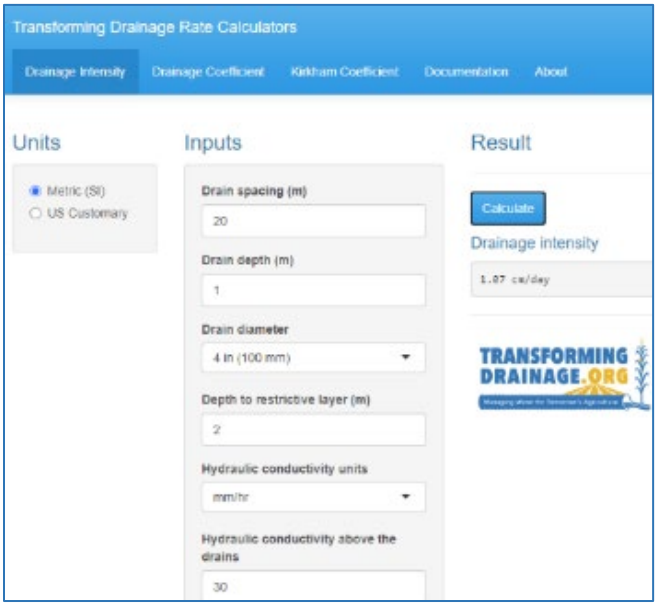
- *Inputs*: Drain spacing, depth, and diameter; Depth to restrictive layer; Hydraulic conductivity above and below the drains
- *Output*: Drainage intensity

Drainage Coefficient (in/day or cm/day) is calculated by Manning's equation and is dependent on the size, slope, and hydraulic roughness of the drains (and where pumped outlets are used, the pumping capacity).

- *Inputs*: Drainage area, grade, diameter, and material
- *Output*: Drainage coefficient

Kirkham Coefficient (in/day or cm/day)

- *Inputs*: Drain spacing, depth, and diameter; Depth to restrictive layer; Ponded water depth; Hydraulic conductivity
- *Output*: Kirkham coefficient



User interface for the Drainage Rate Calculator. Users can determine three standard coefficients for characterizing the hydraulics of subsurface drainage systems.

Author: Chris Hay, Iowa Soybean Association