Bachelor of Biosystems Technology
Faculty of Technology
South Eastern University of Sri Lanka

BSE 11022 – Hydrology and Meteorology

Practical **??** Professor M.M.M. Najim

INTRODUCTION

When water is supplied to the soil surface, whether by precipitation or irrigation, the arriving water penetrates the surface and is absorbed into the soil. Knowledge of this infiltration process is necessary for efficient management of irrigation, drainage, flood, and soil erosion.

Numerous methods have been developed for measuring infiltration rates. Most of them have been developed for specific purposes. Double cylinder infiltrometer used for irrigation studies has number of limitation.

THEORY

Infiltration is the term applied for the process of water entry into the soil, generally by downward flow through the soil surface. The rate of this process called as infiltration rate is defined as the volume flux of water flowing into the profile per unit of soil surface area. For the special condition where in the rainfall rate exceeds the ability of the soil to absorb water, infiltration proceeds at a maximum rate, witch is called the soil's infiltration capacity.

Dimensional analysis:

$$\frac{\text{Volume flux}}{\text{Unit area}}$$

$$\frac{L^3/T}{L^2}$$

$$LT^{-1}$$

(Dimensions of velocity)

Unit: Infiltration rate- mm/hr

The cumulative infiltration, the intake, increases with the time at a decreasing rate. The equation (Kostiakov 1932) for this relationship is given below.

$$I = T^B$$

Where, I – Cumulative infiltration (intake)
T – Time
A, B – empirical constants

$$dI / dT = AB\ T^{(B-1)}$$

$$I = a\ T^{-b} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where, i – Infiltration rate
a, b – empirical constants

The infiltration rate decrease with time becomes constant and is referred to as the basic infiltration rate.

$$\text{Log } I = \log a - b \log T$$
$$y = c - m x$$

When the infiltration rate vs. time is plotted on a log – log paper, the resultant curve has a general slope indicated by the equation 1.

APPARATUS

Two concentric rings (Diameter of 30 and 60 cm)
Measuring cylinder
Stop watch

METHOD

1.Drive the cylinders in to a depth of 10 - 15 cm while taking care to keep cylinder side vertical.

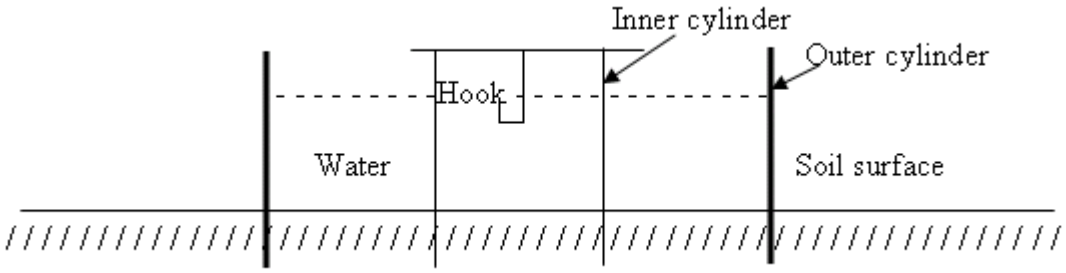
2.Tamp soil in to the space between the soil and the cylinder. If the clearance is greater than 3 mm the cylinder should be reset.

3.Add water in to the cylinder ring to give a head of 5 - 7.5 cm above the soil surface. Maintain the same height in the outer ring. (Avoid undue disturbance to the soil surface when adding water). Note the time at the start of the experiment.

4.Add further measured quantities of water to the central ring at convenient intervals to keep a constant head, noting the time at each addition. Maintain the head in the outer ring similar to that in the inner ring.

(Pointed head of the hook gauge can be used as the reference head in the inner ring)

5.Continue until the intake rate becomes constant.



ASSIGNMENT:

1. Plot a graph of intake against time and determine the basic infiltration rate.
2. Plot the result on a log – log graph and determine the constants a and b.
3. List the limitations of this method.