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RATE OF INFILTRATION—AN *IN-SITU* MEASUREMENT

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When water falls on a given formation a small part of it is absorbed by the top thin layer of soil and the excess water moves downward where it is trapped in the free pore spaces to become groundwater. This process of water entering the strata of soil and percolating downward is known as infiltration and the quantity of water infiltrated depends upon the rate of infiltration which is affected by the thickness of saturated layer and the depth of surface detention, soil moisture, soil compaction during recharge, types and properties of vegetative cover, temperature etc.

The rate of infiltration is normally measured by Infiltrometers or rainfill simulators. These two methods have their own limitations; during the present work an attempt was made to utilize easily available soil moisture meter to measure the infiltration rate in the field. Soil moisture meter measures the amount, in percentage, of the moisture present in the soil, and if measured in fixed intervals of time after the onset of rainfall the rate of change of moisture will be the rate of infiltration. Depending upon the requirement and the aim of the study, the infiltration rate in horizontal and (or) vertical directions can be measured by placing the sensors accordingly.

In the present work, the infiltration rate was measured in horizontal and vertical directions by simulating the rainfall conditions in the field. An area in the vicinity of Thiruvanmiyur, Adyar, Madras measuring 90 cm × 90 cm was inundated with water and a water column of 2 cm was maintained throughout the study period. At the central point of this area six sensors were buried at an equal depth interval of 25 cm vertically below the surface of the earth, (water table was seen in the existing nearby open well and the last sensor was just above the water table). These sensors were used to record the moisture at regular intervals of time.

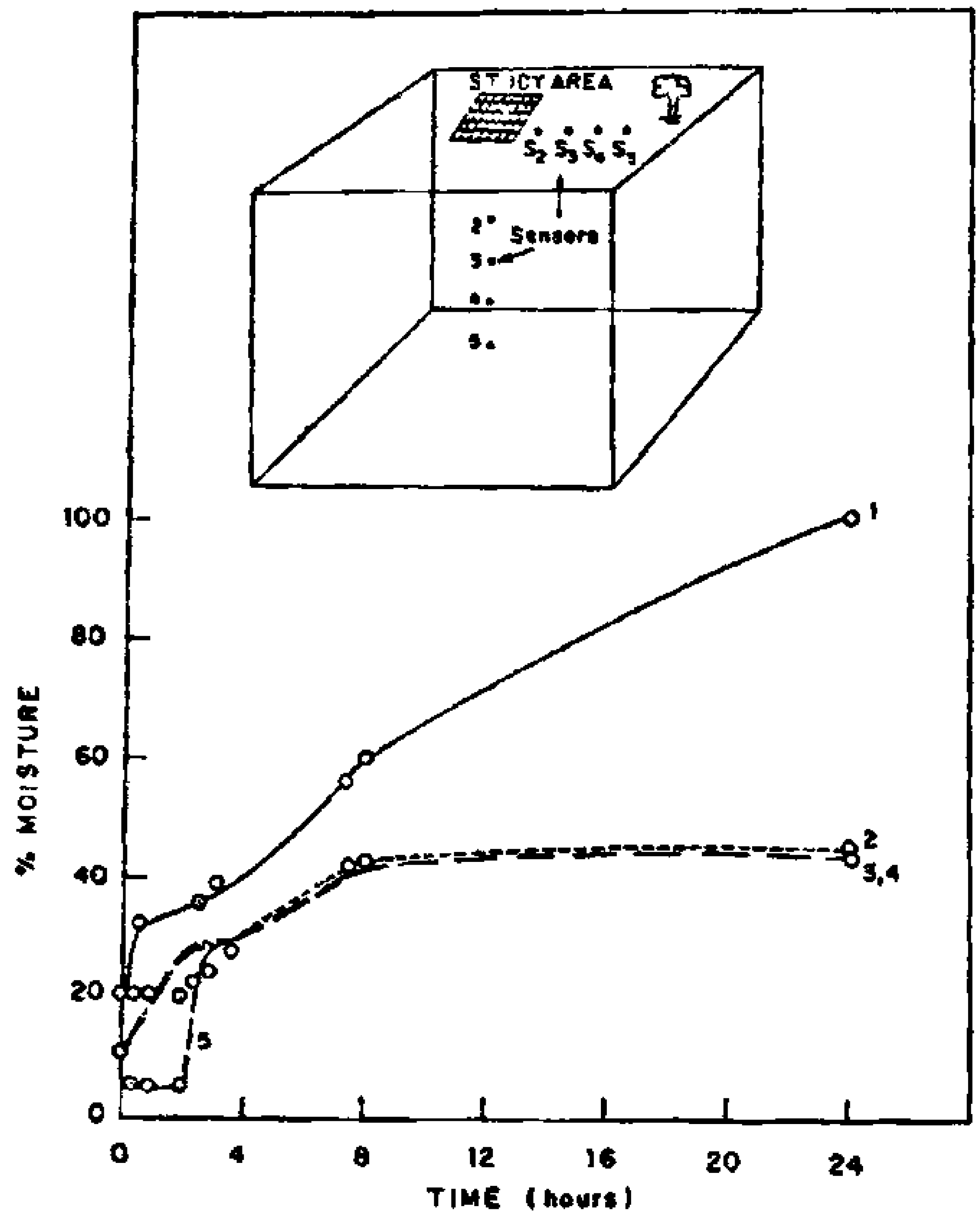

Figure 1.

In addition five sensors were buried outside the chosen area at an interval of 15 cm from each other in the horizontal direction. The moisture measurements were made using Beckman's Boyoucos moisture meter (Model BN-2B) at regular intervals for 24 hr and the observed data lead to the following inferences: (figure 1)

(i) The rate of vertical infiltration is greater than the infiltration rate in horizontal direction. Also, for the same distance, the variations in vertical direction have higher amplitudes than the one in horizontal direction.

(ii) Variations in the soil moisture percentage are faster, in the beginning and slower for large time values (except for the location of the first sensor where it showed a gradual rise).

(iii) Infiltration rate at any instant of time can be obtained by the slope of the curve (figure 1) at that time.

(iv) Variation in infiltration rate with time and depth can be studied by taking an appropriate curve and point on the curve for the computation of slope.

(v) In the case of horizontal measurements a deviation from the expected behaviour was observed at the last sensor, resulting in greater percentage of soil moisture than those sensors which were near the chosen area. This was attributed to a big tree present near the sensor.

(vi) Effect of capillary rise at the point of measurement near watertable is yet to be studied.

It is suggested that near the rainfall stations such areas may be chosen where continuous or discrete records are maintained for variations in soil moisture in horizontal and vertical directions using the method adopted.

The proposed method has the following advantages over the existing techniques:

(i) No separate infrastructure is needed and the infiltration rate can be together with the rainfall data.

(ii) The factors affecting computed infiltration rate are indirectly accounted for because the rate is measured during actual infiltration.

(iii) Horizontal infiltration measurements give the amount of outflow to the nearby area where there is no rainfall.

(iv) This method provides more information with greater accuracy at less additional cost.

Further work using deeper watertable areas and measurements over a longer periods of time is now in progress

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DETERMINATION OF WATER SOLUBLE PHOSPHORUS IN FERTILIZER MATERIALS

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ESTIMATION of water soluble phosphate (P_2O_5) in phosphatic fertilizers by the AOAC method involves the use of perchloric acid. Nitric acid can also be used as an alternative to perchloric acid for preparing molybdovanadate solution. But the comparative efficiency of this method for P estimation has not been studied so far. An attempt has been made to study this aspect in fertilizer solutions.

Four commercial grade fertilizer materials containing different quantities of water soluble phosphate were procured from the market viz, single superphosphate (16% P_2O_5), triple superphosphate (46% P_2O_5), diammonium phosphate (46% P_2O_5) and urea ammonium phosphate (28% P_2O_5). The preparation of fertilizer solutions and the development of yellow colour was followed as given by