

Design and Construction of Lysimeter Set-up

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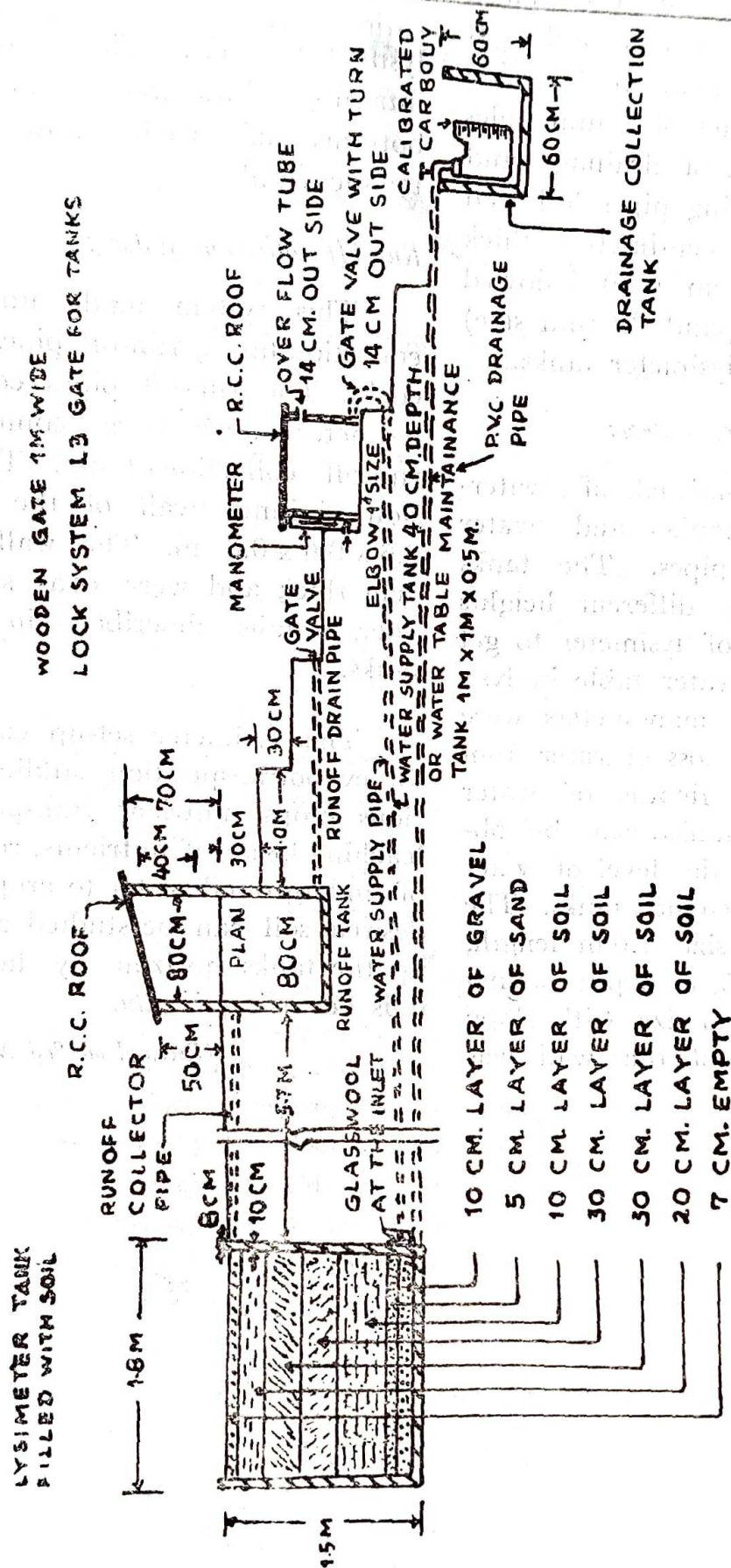
Results of field experiments are more reliable than laboratory or glass-house studies. The control of various factors is much difficult in field. Use of lysimeter can over-come this difficulty to some extent. Various types of lysimeters are in use with their advantages and disadvantages. The lysimeter set-up discussed here is large in size and permanent in nature with different devices of measurement. Effect of temperature on soil due to wall heating is avoided owing to cement concrete walls. A battery of 36 lysimeters was constructed on Crop Research Centre about 100 metres away from meteorological observatory at Pantnagar, Nainital, U.P. Lysimeters were constructed in six batches each of which was located 5.25 m apart. Each batch consisted of 6 lysimeter tanks. These tanks were arranged in two rows keeping equal number of tanks in each row and were placed 1.5 m apart.

Lysimeter Tanks: They were rectangular having the internal dimensions of 1.8 by 1.5 m in area. The depth of tanks was 1.5 m. The tanks were made up of 10 cm thick wall using cement, sand and single on the

ratio of 1:2:4 (cement-sand-single) with reinforcement of iron rod of 1.2 cm diameter. The water proofing compound (Ecoproof) was added at the rate of one kg per bag of cement, one hour before pouring the mix. Tanks were plastered from inside as well as outside with mixture of 1:3 (cement-sand) and one kg of water-proofing compound per bag of cement. Three PVC pipes of two cm diameter resistant to heat and moisture were connected one at bottom, second at 6 cm above the bottom, and third at 5 cm below from the top of the tanks which are called as drainage pipe, water table maintaining pipe and run off pipe, respectively (Fig. 1).

Drainage system:

The drainage system consisted of filter net work at the bottom of each lysimeter tank, drainage pipe and drainage collection tank. The drainage pipes connected to drainage collection tanks at the end of which drain cocks were fitted to regulate the required drainage discharge. The top surface of drainage collection tanks was 3 cm below the bottom of lysimeter tanks to facilitate the flow of water from lysimeter tanks to drainage collection tanks. The size of drainage collection tanks was $0.6 \times 0.6 \times 0.6$ m. Plastic covers were placed on these tanks to prevent loss of water due to evaporation from the tanks or addition of rain water in the tanks.



DIA.1. SECTIONAL ELEVATION OF LYSIMETER SET-UP

Graded filter net work was placed at the bottom of lysimeter tanks. It consisted of wire net, glass wool, gravel and sand. The wire net of 2 mm holes was placed on mouth of drainage and water table maintaining pipes followed by glass wool. Ten centimetres thick layer of gravel (2 cm size) followed by 5 cm layer of sand (2 mm size) were placed in all lysimeter tanks.

Water-table-maintenance system:

This system consisted of water-table-maintenance tanks and water table maintaining pipes. The tanks were constructed at different heights withing the batch of lysimeter to get different depths of water table in lysimeter tanks. Water manometers were installed to read the loss of water from the tanks. Desired depths of water table in lysimeter tanks can be obtained by regulating the level of water in water-table maintenance tanks. The tanks were of the size 1.0 m length, 1.0 m width and 0.5 m depth having window of 0.6 x 0.3 m size with slopy roof. The thickness of the wall was

10 cm and same construction specifications were followed as reported in lysimeter tanks. The water-table-maintaining pipes were connected at the bottoms of each water-table-maintenance tank.

Run-off collection system:

This system made up of run-off collection tanks, run-off pipes and drain cocks. The run-off pipes coming from lysimeter tanks were connected with run-off collection tanks. The dimension of inner wall of the tanks were 0.6 x 0.6 x 0.6 m. The walls were 10 cm rhick and were constructed as per details described in lysimeter tanks.

This lysimeter set-up can be used for evapotranspiration studies for various crops, nutrient transport studies, leaching losses of nutrients, contribution of underground water to crop etc. Any desired soil can be studied after filling up the tanks horizon by horizon as it is occurring *in situ*.

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