

## Experiment No.10

Date-----

### Determination of effective rainfall

#### Aim

To study about measurement of rainfall

#### Materials required

1. Ordinary rain gauge
2. Pen
3. Note book

#### Introduction

Water in any form falling on the earth is called precipitation. The main forms of precipitation falling to the ground are drizzle, rain, snow and hail. Rain is the liquid form of precipitation, while snow and hails consist of solid ice crystals. Dew and frost are ground precipitation, which do not fall but form near and ground on the vegetation. Rain is an import form of precipitation and is the main source of soil moisture for crop production.

#### Rainfall measurement

The principle of rainfall measurement is to measure the depth of the layer of the water that has fallen. Five millimeter of rain means if that rainfall is collected on flat surface, the height of water would have been 5 mm.

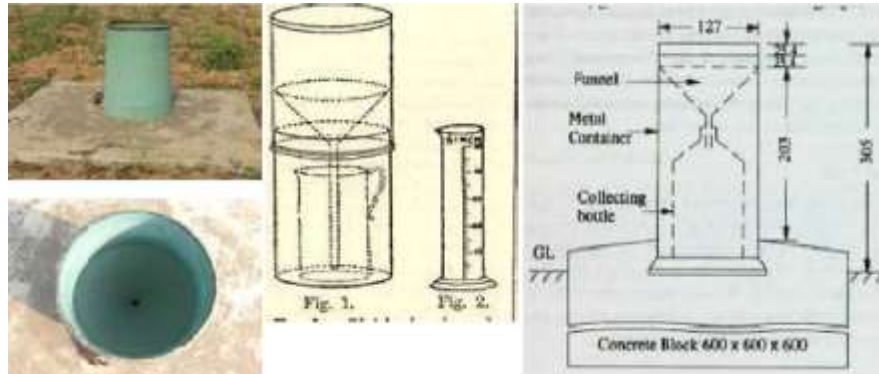
#### Ordinary rain gauge

This rain gauge consists of a funnel, provided with a rim, which is circular and exactly 127 mm in diameter. The rim of the rain gauge is 30 cm above the ground level and 25.4 cm above the cemented plat form. The rain water collected in receiver is measured with the help of a standard measuring cylinder provided with the instrument. The capacity of the receiver is 4 litres. A measuring cylinder calibrated in mm is used to measure the rainfall. The measurement is taken daily at 8.30 hrs IST and 14.00 hrs LMT as and when there is rain. The rainfall of last 24 hrs is recorded in the column of observation day.

## Measurement of rainfall:

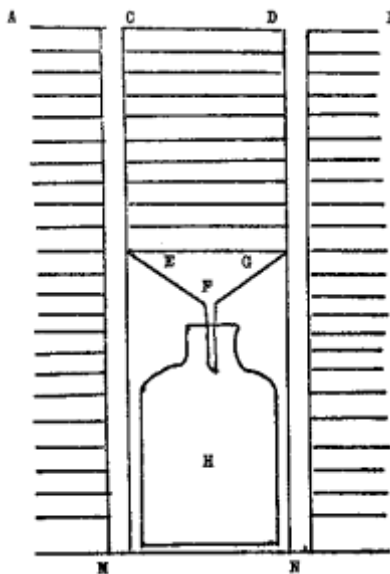
The rainwater from the receiver is carefully poured in to the measuring glass kept on the horizontal surface. The observer maintains his eye at the level of water in the measuring glass. Reading is noted from the lower meniscus avoiding parallax.

## Ordinary rain gauge



## Ramdas Method

Ramdas (1960) suggested a direct field method using a small portable device containing soil of the field, so eliminating the necessity of sampling.



Ramdas Apparatus for Measuring Effective Rainfall

The apparatus as shown, consists of a cylinder (CD) of about 30 cm in diameter, with a perforated base (BO) and a funnel (F) leading into a receiver bottle (H). All these parts are enclosed in an outer cylinder (MN). The cylinder (CD) is filled with a representative soil with the same density as that of the field. The height is equal to the depth of the effective root zone of the crop.

The apparatus is installed in the field crop where the effective rainfall is to be measured. The crop in the container is irrigated along with the field crop. Excess rain or irrigation water drains in the receiver bottle H and is measured from time to time. The total rainfall minus the ineffective rainfall gives the value of effective rainfall. It is assumed that there is no surface runoff. Cylinders of different lengths are used consistent with the rooting depth of the different crops. With a suitable number of replications, the method is very useful. It is simple and practical and furnishes direct readings.

### **Determination of the Effective Rainfall**

The amount, the intensity and the distribution of rainfall is important.

1. When rain water falls on the soil surface, some of it infiltrates into the soil, some stagnates on the surface, while some flows over the surface as runoff.
2. When the rainfall stops, some of the water stagnating on the surface evaporates to the atmosphere, while the rest slowly infiltrates into the soil.
3. From all the water that infiltrates into the soil, some percolates below the root zone, while the rest remains stored in the root zone.

In other words, the effective rainfall is the total rainfall minus runoff minus evaporation and minus deep percolation.

$$\mathbf{EF = Total\ rainfall - runoff - evaporation - deep\ percolation}$$

Only the water retained in the root zone can be used by the plants, and represents what is called the **effective part of the rainwater**.

The term effective rainfall is used to define this fraction of the total amount of rainwater useful

for meeting the water need of the crops.

Only 2 simple formulae are provided to estimate the fraction of the total rainfall which is used effectively. These formulae can be applied in areas with a maximum slope of 4-5%:

$$Pe = 0.8 P \text{ if } P > 75 \text{ mm/month}$$

$$Pe = 0.6 P \text{ if } P < 75 \text{ mm/month}$$

With,  $P$  = rainfall or precipitation (mm/month)

$Pe$  = effective rainfall or effective precipitation (mm/month)

**NOTE:  $Pe$  is always equal to or larger than zero; never negative**

## Observations

## Problems

1. Calculate the effective rainfall for the following months in mm

Sl. No.	Date	Rainfall (mm)	ET (mm)	Balance (mm)	Surplus (mm)	Cum.ER (mm)
1						
2						
3						
4						
5						
6						
7						
8						

<b>9</b>						
<b>10</b>						
<b>11</b>						
<b>12</b>						
<b>13</b>						
<b>14</b>						
<b>15</b>						
<b>16</b>						
<b>17</b>						
<b>18</b>						
<b>19</b>						
<b>20</b>						
<b>21</b>						
<b>22</b>						
<b>23</b>						
<b>24</b>						
<b>25</b>						
<b>26</b>						
<b>27</b>						
<b>28</b>						

<b>29</b>						
<b>30</b>						
<b>31</b>						
<b>Total</b>						

### **Precautions**

- The funnel should not get choked with dirt.
- The receiver should be always kept clean.
- The measuring glass should be kept spotless clean.
- All the parts should be examined regularly for choking and leakage.
- While replacing the funnel, see that it is pressed down evenly from all sides.

### **Practical significance**

This method was devised assessing crop evapotranspiration, percolation, effective and ineffective rainfall of a rice crop simultaneously under the field conditions.

### **Conclusion**

**Signature of Faculty In-charge**