Improving Water Use for Dry Season Agriculture by Marginal and Tenant Farmers in the Eastern Gangetic Plains

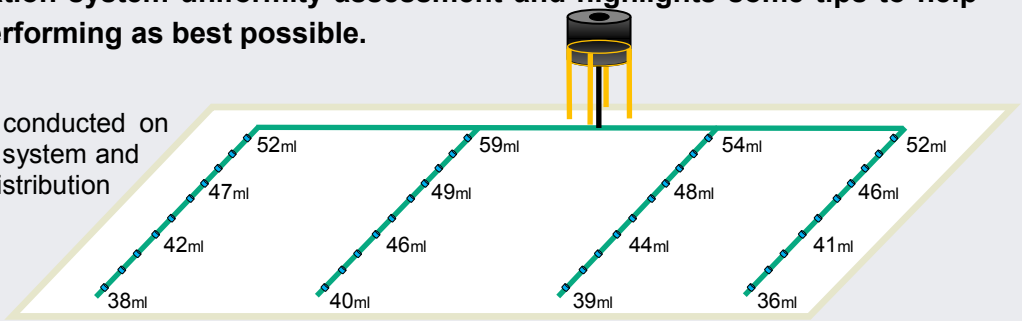
TRAINING SHEET

Calculating the uniformity of drip irrigation

Drip irrigation is often considered to be a highly efficient method for irrigating a range of crops. However if the irrigation system is not installed and maintained, the performance and the efficiency can vary significantly. This Training Sheet explains the method for and the calculations for undertaking a drip irrigation system uniformity assessment and highlights some tips to help ensure that the system is performing as best possible.

Catch can tests

Simple catch can trials can be conducted on any type of pressurised irrigation system and the data used to calculate the distribution uniformity for the system.



Distribution Uniformity

The Distribution Uniformity (DU) is an important parameter because poor irrigation uniformity often produces large variations in crop yield and quality. It is also a major factor contributing to low water use efficiency and excessive leaching of nutrients and fertiliser out of the root zone. Improving DU can also lead to better economic returns.

$$DU = \frac{Average\ of\ the\ lowest\ 25\%\ of\ depths\ applied}{Average\ depth\ applied}$$

What you'll need

To assess the distribution uniformity of a drip irrigation system some basic equipment is needed.

- At least 12 catch cans (cut down plastic water bottles are perfect for this
- A stopwatch (i.e. clock on a mobile phone)
- A measuring cup, flask or a large syringe

Step 1 - Collecting flow data

The irrigation system needs to be pressurised before the test is conducted. Check that emitters are not blocked .choose the positions to place the catch cans. Start the stopwatch and the irrigation system at the same time. The duration for the test will depend on the size of the catch can and the flowrate of the system. The test should be no less than 5 minutes. Quickly remove the cans from underneath the dripper.

Step 2 - Calculating the average of the lowest 25%

Investigate any very full or very empty cans. Use the measuring cup or syringe to measure the volume in each can and record on the revers of this sheet

52	59	54	52
47	49	48	46
42	45	44	41
38	40	39	36

Record the volumes in each can

36	38	39	40
41	42	44	46
46	47	48	49
52	52	54	59

Sort the data from smallest to largest

Add up the volumes of the lowest 1/4 of cans (circled) and divide by the number of cans in the lowest quarter

(36+38+39+40)/4 = 38.25ml

Step 3 - Calculating the average depth

Add up the volumes in all the cans and divide by the number of cans

$$\frac{(36+38+39+40+41+42+44+46+46+47+48+49+52+52+54+59)}{16}$$

= 45.81ml

Step - 4 Calculating the Distribution Uniformity

= 38.25/45.81 **= 83%**

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TRAINING SHEET

Calculating the uniformity of drip irrigation

Date | Assessor/s

Village | Site | System

Step 1 - Collecting flow data

1.1 Position catch cans under at least 3 drippers on each lateral (beginning, middle and end)

1.2 Start the stopwatch and the irrigation system (or place catch cans under drippers simultaneously)

1.3 Run time of Test _____ seconds (must be no less than 300 seconds)

1.4 Record catch can volumes (fill in the table with the volumes from each catch can

Lateral 1	Lateral 2	Lateral 3	Lateral 4	Lateral 5	Lateral 6

Step 2 - Calculating the average of the lowest 25% of catch cans

2.1 Write the volumes of the catch cans in order from smallest to largest

Circle the lowest quarter (25%) of the values

2.2 Add up the values of the circled cans in Table 2.1 _____

2.3 Count number of cans in circled cans in Table 2.1 _____

2.4 Divide **2.2** by **2.3** _____

Step 3 - Calculating the average depth of all catch cans

3.1 Add up the values of all the cans in Table 2.1 _____

3.2 Count by the total number of cans in Table 2.1 _____

3.3 Divide **3.2** by **3.1** _____

Step 4 - Calculating the Distribution Uniformity (DU)

4.1 Divide **2.4** by **3.3** _____ %

To calculate the **average flow rate**

Multiply Step **3.3** by 1,000 and then divide by Step **1.3**

_____ L/s

To calculate the **average application rate**

Multiply the average flow rate by 3,600 then divide by the area (m^2)of the irrigation system

_____ mm/hour