IMPROVING IRRIGATION EFFICIENCY PROJECT

Irrigation Scheduling

Application Rate of Micro Irrigation

Introduction

The application rate of you system is very important to the overall management of your irrigation system, and will determine certain aspects of your irrigations. The application rate along with your Readily Available Water (RAW) data will determine the timing and length of your irrigation.
The application rate should not exceed the soils infiltration rate otherwise excess runoff can occur and result in inefficient water use.

Flow rate

To calculate application rate you firstly need to know the flow rate of your emitter (sprinklers). This is done using a bucket, measuring jug (in millimeters), and a stop watch.
Place the emitter in a bucket for 60 seconds, the emitter must still be operating as it normally would in the field (however you can turn it upside down in the bucket). Using the measuring jug calculate the milliliters (ml) and write this figure down. This should be done in several locations to obtain an average for an irrigation shift. Generally the highest and lowest elevation point on the shift and the furthersest and nearest point to the valve is used. Other points are usually picked to obtain about 10 readings.

Calculating Flow rate

Flow rate (L/hr) =

$$\frac{\text{water collected in milliliter (ml)} \times 3.6}{\text{Time of collection in seconds}}$$

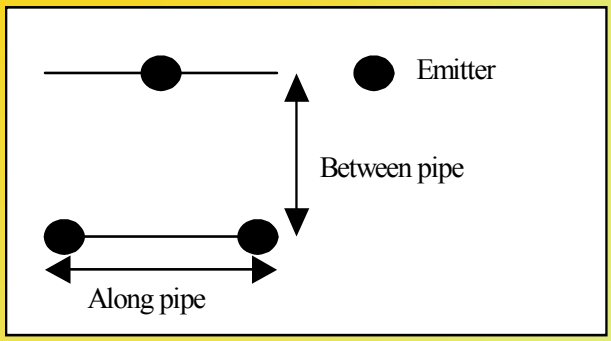
If you collected 2900 ml in 60 seconds then the flow rate in liters per hour is:

$$\frac{2900 \times 3.6}{60} = 174 \text{ L/hr}$$

This can then be done for the other readings you recorded.

Emitter Spacing

Emitter spacing is also required to calculate application rate. The spacing in meters is required along the pipe as well as between the pipe and should be uniform throughout an irrigation shift. The distance along the pipe is



from emitter to emitter. However the distance between the pipe is not emitter to emitter, but the actual distance between the pipes (laterals). These measurements need to be collected in meters (m)

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Calculating Application Rate

Using the Flowrate and Emmitter spacing information you have collected, you can now calculate the Application rate.

$$\text{Application rate (mm/hr)} = \frac{\text{Emitter Flowrate (L/hr)}}{\text{Along pipe (m) x Between pipe (m)}}$$

Therefore if you had a Emitter flowrate of 174 L/hr and a emitter spacing along the pipe of 5 meters and between the pipe of 6.2 meters then the calculation would be as follows:

$$\frac{174 \text{ (L/hr)}}{5 \text{ (m)} \times 6.2 \text{ (m)}} = 5.6 \text{ mm/hr}$$

This can also be done for other information you have collected and then all application rates can be averaged to give you a more representative figure.

How can this information be used?

If you know your RAW for the irrigation unit you are looking at and you know you are at refill point then you will want to know how long to apply water to bring water back up to field capacity.
For example you have a RAW of 30mm your soil moisture is currently at refill point and you know your irrigation system applies 5.6mm/hr. Therefore to calculate how long your system would need to run (from refill point) you can follow the following calculation:

$$\text{Irrigation time in hours} = \frac{\text{Readily Available water (RAW)}}{\text{Application rate}}$$

In this case

$\frac{30 \text{ (mm)}}{5.6 \text{ (mm/hr)}}$ = 5.4 hours or approx. 5 ½ hours.

For Further information contact your local Irrigation Field Officer:

Renmark Irrigation Trust	85 864 510
Central Irrigation Trust	85 807 100
Private Areas – Riverland	85 824 477
Private Areas – Lower Murray	85 325 262