



# Measuring Irrigation Uniformity

Applying water efficiently demands that the sprinkler irrigation system apply water uniformly throughout the irrigated area. The following test procedure collects water in irrigation cups placed throughout the irrigation zone and compares amounts of water collected in the lowest 25% of all cups with the overall average of water collected in all cups. Irrigation uniformity values >80% are generally recommended.

## Procedures for Determining Irrigation Uniformity and Rate

1. Place irrigation gauges (cups, pails, etc.) throughout the irrigation zone. 20-30 gauges per irrigation zone is a general guide.
2. Irrigate long enough to collect. 0.5 inches of irrigation water (sprinkler) or 1-2 gallon (micro). Record the irrigation run time in minutes.
3. Measure volume of water collected in each gauge. Keeping track of gauge location can help troubleshoot problem areas.

## Calculations

(1 g = 1mL = 1cm<sup>3</sup> ; 1 gallon = 3785 cm<sup>3</sup> = 3.785 kg = 3.785 L)

a) Irrigation gauge area (cm<sup>2</sup>) =  $\pi r^2 = [\text{container diameter (cm)} / 2]^2 * 3.14159$

b) Irrigation uniformity = (avg. volume collected in lowest 25% of cups divided by the avg. volume collected in all cups) \* 100%

c) Irrigation depth (inch) = avg. volume collected (cm<sup>3</sup>) ÷ gauge area (cm<sup>2</sup>) ÷ 2.54 cm/inch

d) Irrigation rate (inch/hour) = irrigation depth (inch) ÷ run time (min) \* 60 min/hour



Fig 1. Hole-less pots are placed throughout the irrigated area to determine uniformity of irrigation water application. In this photo, five pots are placed across the irrigated zone - this was repeated in three other areas to give a total of 20 hole-less pots per irrigated zone.

### Sprinkler Example

**Data** Irrigation gauge diameter = 10 inch = 25.4 cm  
Total number of irrigation gauges = 20  
Avg. volume of water collected in all 20 gauges = 560 g = 560 cm<sup>3</sup>  
Avg. volume of water collected in lowest 15 out of 20 gauges = 475 cm<sup>3</sup>  
Irrigation run time = 55 min

### Calculations

- a) Irrigation gauge area =  $\pi r^2 = (25.4 \text{ cm}/2)^2 * 3.14159 = 507 \text{ cm}^2$
- b) Irrigation uniformity =  $475 \text{ cm}^3 / 560 \text{ cm}^3 * 100\% = \mathbf{85\%}$
- c) Irrigation depth =  $560 \text{ cm}^3 \div 507 \text{ cm}^2 = 1.1 \text{ cm} = 0.43 \text{ inch}$
- d) Irrigation rate =  $0.43 \text{ inch} * 60 \div 55 = \mathbf{0.47 \text{ inch/hour}}$

### Micro Example

**Data** Total number of irrigation cups = 1.65 kg = 1650 cm<sup>3</sup>  
Avg. volume of water collected in lowest 15 out of 20 cups = 1.48 kg = 1380 cm<sup>3</sup>  
Irrigation run time = 5 min

### Calculations

- a) Irrigation uniformity =  $1380 \text{ cm}^3 / 1650 \text{ cm}^3 * 100\% = \mathbf{84\%}$
- b) Irrigation rate =  $1650 \text{ cm}^3 \div 5 \text{ min} = \mathbf{330 \text{ cm}^3/\text{min}}$   
 $330 \text{ cm}^3/\text{min} \times 60 \text{ min/hour} \div 3785 \text{ cm}^3/\text{gallon} = \mathbf{5.23 \text{ gal/hour}}$