

## ***Irrigation Efficiency and Uniformity Distribution***

### **Irrigation Efficiency or (IE)**

The net amount of water added to the root zone is divided by the amount of water taken from some source.

- **Water applied is never 100% beneficially used.**

### **There is always some loss**

- Evaporation from soil and leaf surface
  - ✓ Evaporation losses can range from 1% to as much as 30%
- Spray loss from water stream
  - ✓ Losses range from 1% to 4%
- Surface runoff
- Deep percolation (water pushed past the root zone)

### **Highly Irrigation Efficiency dependent on:**

- Irrigation System Design
- Water Management
- Maintenance and Repairs
- Environmental Considerations
- Technology and Automation

### **Calculating Irrigation Efficiency**

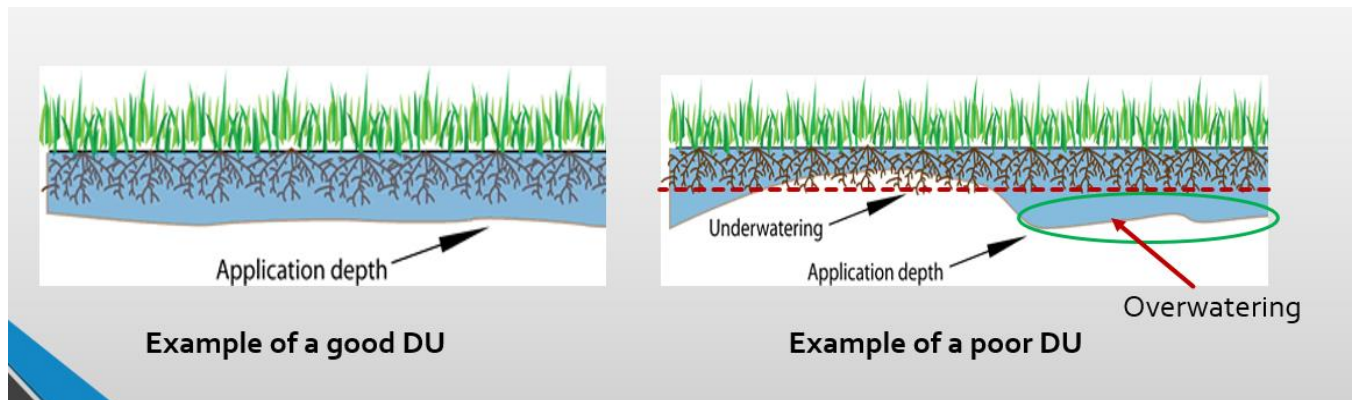
$$IE = \frac{d}{V_w} \times 100$$

**IE** = irrigation efficiency , **d** = Water stored in the rootzone  $m^3$  , **V<sub>w</sub>** = total volume of water applied  $m^3$

**Example (1)** Calculate the irrigation efficiency if the water irrigation stored in the rootzone for an area of 1 ha is 20.3 mm, and The total water volume delivered during irrigation is 280  $m^3$ .

### Distribution Uniformity or DU

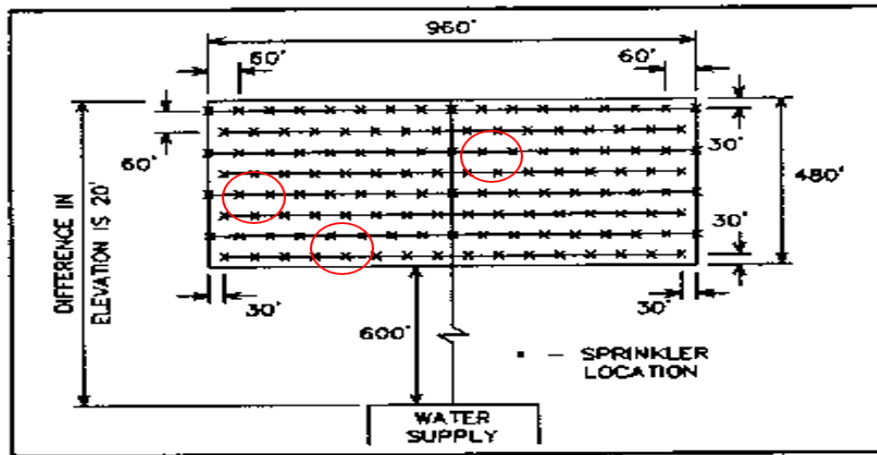
Distribution Uniformity is the measure of how uniformly the water is applied when irrigation the area.



### Steps of Measuring Distribution Uniformity (DU)

- **Sprinklers**
- **Catch can evaluation**
  - Place catch cans (minimum of 24) in an equal grid spacing
  - Run sprinklers to gain a representative sample
  - Measure and record the amount of water collected in each catch can
  - Multiple tests give more accurate results
    - Near where the main line branches into laterals
    - In the middle of the field
    - At the ends of the laterals

## Test Locations



Place all of the numbers  
in order from highest to  
lowest

122 ml  
119 ml  
118 ml  
118 ml  
115 ml  
110 ml  
108 ml  
105 ml  
105 ml  
104 ml  
100 ml  
99 ml  
99 ml  
97 ml  
96 ml  
96 ml  
96 ml  
92 ml  
91 ml  
90 ml  
90 ml  
88 ml  
88 ml  
87 ml

- $$DU = \frac{\text{Average of the lowest } \frac{1}{4}}{\text{Average of all}} \times 100$$

## Drip or Micro Sprinklers

### Emitter Uniformity

- Since we are not covering the entire ground surface, we only measure the water that is emitted during a certain time.
- Measure the water from the emitter during a given time
- Record the amount of water collected from each emitter
- Calculate emitter uniformity using the same method as used with the sprinkler catch can collection



### Example 2:

Calculate the uniformity distribution for the drip irrigation if you have the below data:

57, 53, 64, 47, 62, 48, 50, 61, 57, 61, 58, 57, 55, 53, 51, 50,