

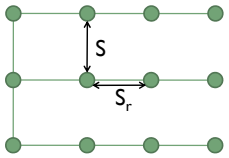
## Sprinkler Layout and Uniformity



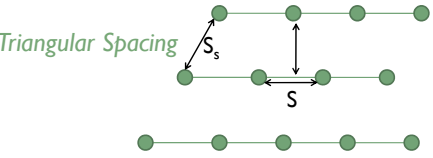
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## Sprinkler Spacing



*Square Spacing*





*Triangular Spacing*

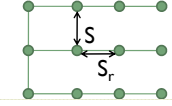
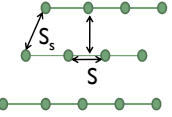


## Head Spacing

- Uniformity
- Wind effects
- Dependability of sprinklers
  - A broken or stuck sprinkler isn't doing its job
- Sprinkler overthrow and overlap
  - Runoff on streets or sidewalks many times is the result of improper sprinkler layout or excessive applications due to overlap

## Compensating for Wind

- 0 – 3 mph winds
  - $S_s \ \& \ S_r = \text{Diam.} \times 0.55$
- 4 – 7 mph winds
  - $S_s \ \& \ S_r = \text{Diam.} \times 0.50$
- 8+ mph winds
  - $S_s \ \& \ S_r = \text{Diam.} \times 0.45$

## Sprinkler Uniformity





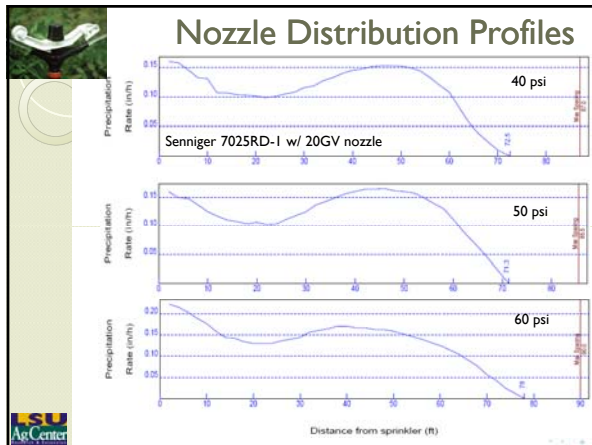
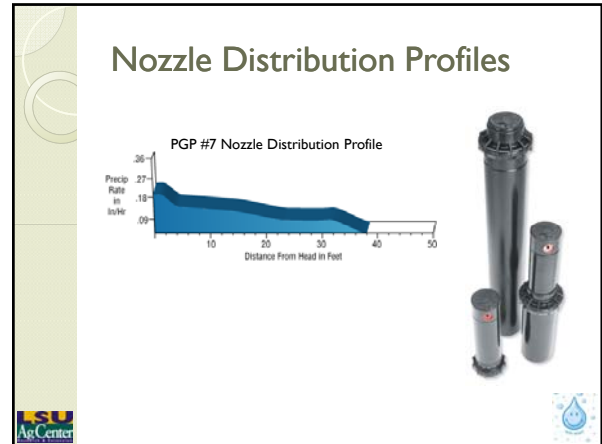
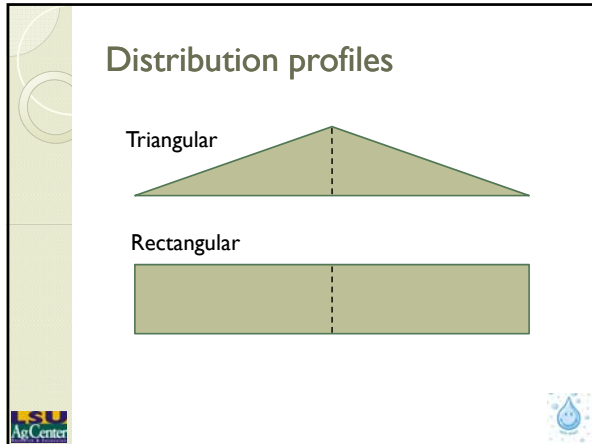


## Uniformity

- The less uniform a system is, the more water it takes to deliver the appropriate amount of water to a plant
- DU = Distribution uniformity

| DU (percent) | Water the plant needs | + | DU (decimal) | = | Amount of water you need to apply to keep dry areas green |
|--------------|-----------------------|---|--------------|---|---|
| 30%          | 1.00"                 | + | 0.30         | = | 3.33"   |
| 50%          | 1.00"                 | + | 0.50         | = | 2.00"   |
| 70%          | 1.00"                 | + | 0.70         | = | 1.42"   |

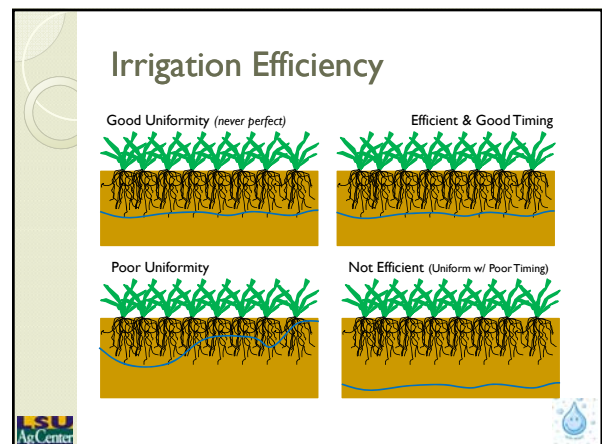





### Sprinkler Types and Quality



| Sprinkler Type       | Excellent (Achievable) | Good (Expected) | Poor (if lower than this, consider not scheduling) |
|----------------------|------------------------|-----------------|--|
| Single Stream Rotors | DU = 80%               | DU = 75%        | DU = 55%   |
| Fixed Spray Heads    | DU = 75%               | DU = 65%        | DU = 50%   |

- ### Factor affecting uniformity
- Wind speed, direction
  - Water pressure
  - Stream deflection, foliage
  - Broken or clogged heads
  - Clogged lines
  - Malfunctioning valves






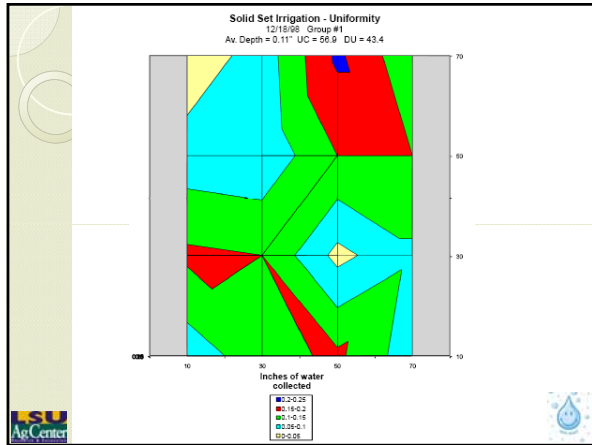
## Calculating Sprinkler Uniformity

- Distribution Uniformity ( $DU_{LQ}$ )
  - Focus is on under watered areas
- Scheduling Coefficient (SC)
  - Creates a “multiplier” to use to properly water dry areas
- Coefficient of Uniformity (CU)
  - Treats wet and dry areas the same

## Irrigation Audits

Checking how well you did








| Can #      | Low Quarter (LQ) |   |   |   |    |    |    |    | Average |
|------------|------------------|---|---|---|----|----|----|----|---------|
|            | 1                | 2 | 3 | 4 | 5  | 6  | 7  | 8  |         |
| Catch (ml) | 2                | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 9       |
| Deviation  | 7                | 5 | 3 | 1 | 1  | 3  | 5  | 7  | 4       |

$$CU = 100 \times \left[ 1 - \frac{\text{Avg. Deviation}}{\text{Avg. Catch}} \right] = 100 \times \left[ 1 - \frac{4}{9} \right]$$

$$CU = 100 \times [1 - 0.44] = 100 \times [0.56] = 56\%$$

$$DU = 100 \times \left[ \frac{\text{Avg. Catch}_{in\_LQ}}{\text{Avg. Catch}} \right] = 100 \times \left[ \frac{3}{9} \right]$$

$$DU = 100 \times [0.33] = 33\%$$



## Performance Criteria

- DU; CU
  - > 75% = Excellent
  - 50 – 75% = Good
  - <50% = Poor





## Sprinkler Layout and Uniformity



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