

Surface Irrigation

Uniformity

- **Inherent non-uniformity because recession and advance curves are not parallel**
- **Factors affecting**
 - **Inflow rate**
 - **Slope**
 - **Soil infiltration**
 - **Roughness**
 - **Channel shape**
 - **Inflow time**
 - **Length of run**
- **Part of infiltration may go to deep percolation**

Efficiency

- **Volume balance**

- $V_g = V_z + V_s + V_r$

- $g \rightarrow$ gross

- $z \rightarrow$ infiltration

- $s \rightarrow$ surface storage

- $r \rightarrow$ runoff

- (or depth basis): $d_g = d_z + d_s + d_r$

- Part of infiltration may go to deep percolation

Improving Irrigation Efficiency

- **Alternate furrow irrigation**
 - Increases advance time, but reduces average infiltration depth (twice the width)
- **Cutback irrigation**
 - Use large inflow rate during advance, and then reduce the inflow to match the soil's steady-state infiltration rate
 - Intensive management is required

Improving Irrigation Efficiency Cont'd

- **Land smoothing and laser grading**
 - Helps to improve uniformity
- **Surge irrigation**
 - Alternate on-off periods for applying water
 - Achieve higher efficiencies and uniformities in some soils
 - Lends itself to semi-automation

Sprinkler Irrigation (impact sprinkler)

- Impact Sprinklers
- High pressure system commonly used prior to current concerns about energy prices and water conservation.
- Application diameters range from 50 to more than 100 ft
- Water loss during application can range from 25-35% or more

[Picture from:](http://www.irrigationmuseum.org/item1.aspx?id=125)

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Sprinkler Irrigation (impact sprinkler)

- Reducing the upward angle can reduce water loss
- These systems are still used for waste disposal because large nozzles and high evaporation can be beneficial
 - In humid environments excess soil moisture is primary limitation for waste disposal

Sprinkler Irrigation (Low Pressure Applicators)

- Mid-elevation spray application (MESA)
- Low-elevation spray application (LESA)
- Low energy precision application (LEPA)

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Drip Tubing

Wetting Pattern

60 in

60-inch dripline spacing is satisfactory on silt loam & clay loam soils