

# LANDSCAPE WATER MANAGEMENT

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# Purpose

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- Reduce water use
- Save money
- Improve landscape appearance
- Reduce runoff
- Apply water to the root zone (where it's needed)
- Reduce fertilizer and chemical requirements

# Ways to Save Water

1. Improve sprinkler system performance
  - ▣ Efficiency
2. Proper scheduling
  - ▣ Meet plant water requirements
  - ▣ Achieved by:
    - ▣ Checking and fixing equipment
    - ▣ Following the weather throughout the growing season
    - ▣ Maintaining the sprinkler system at peak efficiency

# Landscape Water Management Procedures

- Irrigation Audits
  - ▣ Site Inspection/System Tune-up
  - ▣ System Test
  - ▣ Calculate a Base Watering Schedule
- Irrigation Management
  - ▣ Implement a Base Schedule/Schedule Adjustment
  - ▣ System Maintenance
  - ▣ Track Water Use

The slide features a horizontal bar at the top. The left portion of this bar is a solid orange rectangle. The right portion is a solid blue rectangle. The text "Irrigation Audit" is written in white, sans-serif font across the blue portion of the bar.

# Irrigation Audit

# Irrigation Audit

- Obtain information about irrigation system performance
  - ▣ Site Inspection/System Tune-up
  - ▣ System Tests
    - Precipitation Rate (PR)
    - Distribution Uniformity (DU)

# Irrigation Audit

- Site Inspection/System Tune-up Procedures
  - Locate Irrigation Equipment
  - Site Inspection/Station Operation
  - System Tune-up

# Irrigation Audit

- Locate Irrigation Equipment
  - ▣ Find point of connection and irrigation controller(s)
- Controller identification
  - ▣ Identify and record features
    - Programs
    - Start times
    - Percent adjustments
    - Number of stations and locations
  - ▣ Use remote control or assistant with a two-way radio

# Irrigation Audit

- Site Inspection/Station Operation
  - Identify by station
    - Plant material type
    - Soil type
    - Sprinkler type
      - Rotor
      - Spray
  - Identify problems
    - Low/High pressure
    - Misaligned heads
    - Leaks

# Irrigation Audit

- System Tune-up
  - ▣ Perform system adjustment and repair
  - ▣ Typical problems (may or may not be able to fix)
    - Old or worn out equipment
    - Improperly spaced sprinklers
    - Improper zoning
    - Limited controller capability
    - Incorrect pressure
    - Wrong nozzle selection
    - And more...

# Irrigation Audit

- System Tests (Catch Cup Test)
  - ▣ Used to collect data about irrigation system performance
    - Precipitation Rate
    - Distribution Uniformity
  - ▣ Measuring devices (catch cups) are placed in irrigated turf areas
  - ▣ Measures amount of water put out by irrigation system

# Irrigation Audit



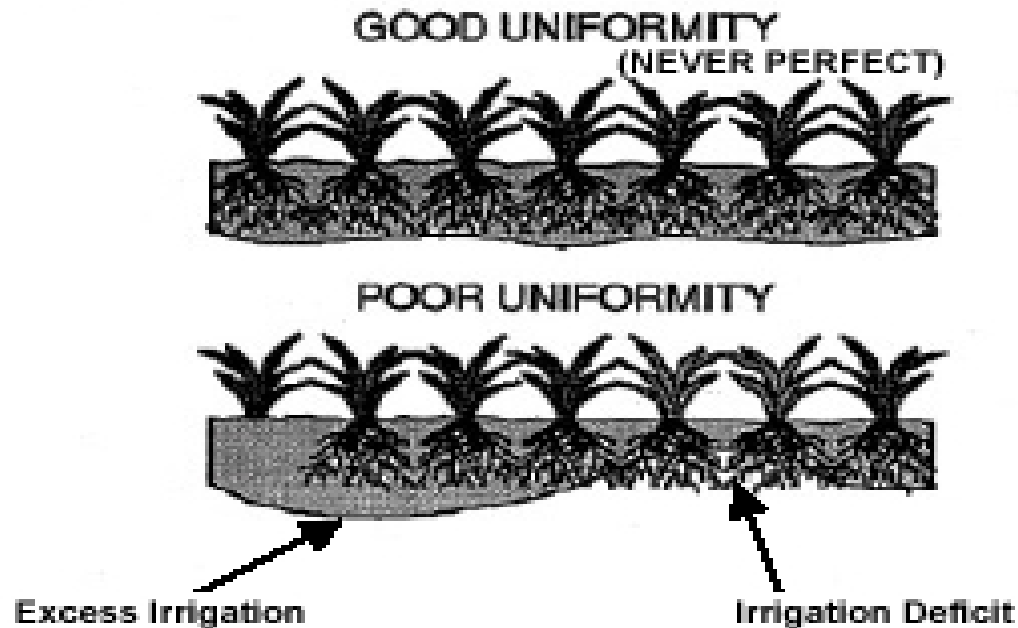
# Irrigation Audit

- Precipitation Rate
  - ▣ Rate that irrigation water is applied
  - ▣ Measure in inches of water per hour (in./hr)
  - ▣ Affected by:
    - Pressure
    - Head Spacing
    - Sprinkler Type and Nozzle
  - ▣ Critical factor in design
    - Precipitation rate can be greater than soil intake rate

# Irrigation Audit

- Distribution Uniformity
  - ▣ How evenly irrigation system applies water
  - ▣ Low uniformity = excessively wet or dry areas

Figure 1.



# Irrigation Audit

- Distribution Uniformity
  - Statistical value of uniformity of sprinkler coverage

Sprinkler Type	Excellent (Achievable)	Good (Expected)	Poor (Improvement Needed)
Rotary	80%	70%	55%
Spray	75%	65%	50%

- Affected by:
  - Head spacing
  - Pressure
  - Interference
  - Wind

# Irrigation Audit

- Distribution Uniformity
  - ▣ Directly affects amount of irrigation water needed

DU (Percent)	Water the plant	÷	DU (Decimal)	=	Amount of water needed to keep dry
30%	1 inch	÷	.30	=	3.33 inches
50%	1 inch	÷	.50	=	2.00 inches
70%	1 inch	÷	.70	=	1.42 inches
80%	1 inch	÷	.80	=	1.25 inches

# Irrigation Audit

- Using information collected through irrigation audit
  - Irrigation System Equipment
  - Plant Material Type
  - Soil Type
  - Precipitation Rate
  - Distribution Uniformity
- Create a Base Watering Schedule



# Proper Scheduling

# Proper Scheduling

- Foundation for Good Water Management
- Create a Base Schedule
  - ▣ Developed based on reference time period
    - Weekly
    - Monthly
  - ▣ Should be developed for at least each month of growing season
  - ▣ Many controllers have features that facilitate seasonal adjustment

# Proper Scheduling

Creating a Base Watering Schedule Requires:

- Understanding of the relationship between
  - Plant Material
  - Weather
  - Soils
  - Irrigation
- Goal is to meet plant water requirements

# Proper Scheduling

- Plant Material
  - ▣ Water requirements can vary
  - ▣ Plants stress from both too little and too much water
- Weather
  - ▣ Influences plant water requirement
  - ▣ Evapotranspiration (ET)
    - Combination of evaporation and transpiration

# Proper Scheduling

- Evapotranspiration (ET)
  - Evaporation
    - Water lost from the soil surface
  - Transpiration
    - Water used by the plant
  - Influenced by:
    - Sunlight
    - Wind
    - Air Temperature
    - Humidity

# Proper Scheduling

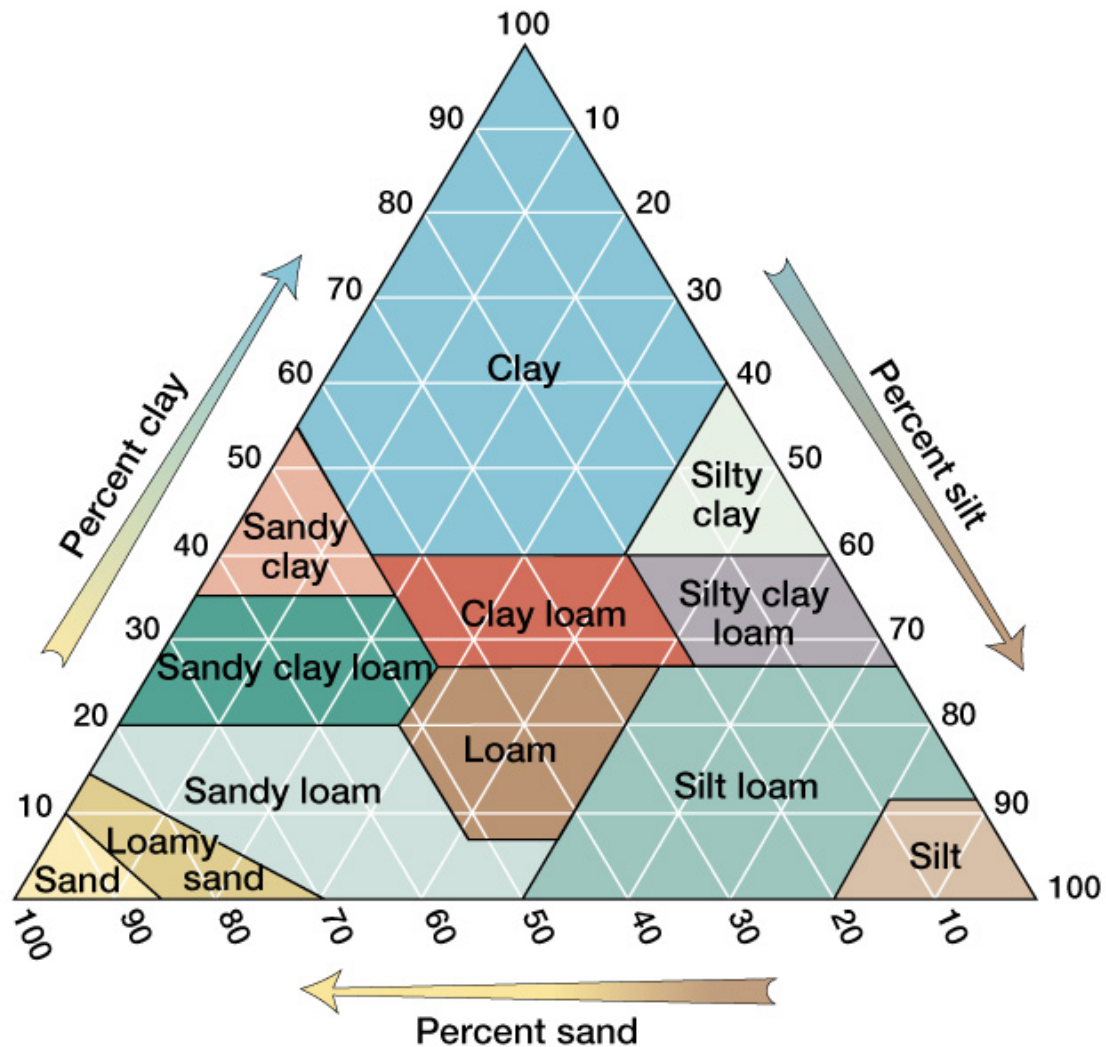
- Evapotranspiration (ET)
  - ▣ ET rates vary throughout growing season
  - ▣ ET rates vary by plant type
- Reference ET
  - ▣ ET rate for basic crop type
    - Turf
    - Alfalfa
- Crop Coefficient
  - ▣ Adjusts ET based on site conditions

# Proper Scheduling

- Soils
  - ▣ Types of Soil
    - Sand
    - Silt
    - Clay
  - ▣ Influences
    - Basic Intake Rate
    - Available Water



# Soil Texture Triangle



# Proper Scheduling

## Basic Intake Rates and Available Water

Soil Texture Class	Available Water (in./in.)	Basic Intake Rate (in./hr)
Clay	.17	.10
Silty Clay	.17	.15
Clay Loam	.18	.20
Loam	.17	.35
Sandy Loam	.12	.40
Loamy Sand	.08	.50
Sand	.06	.60

# Proper Scheduling

- A Base Watering Schedule Considers:
  - Plant Water Requirement
    - Evapotranspiration
    - Plant Material
    - Soil Characteristics
  - Irrigation Water Requirement
    - Irrigation System Performance
      - Distribution Uniformity
      - Precipitation Rate

# Proper Scheduling

- Key Elements
  - Total Run Time per Period
  - Irrigation Days per Period
  - Total Run Time per Day
  - Run Time per Cycle
  - Cycles per Day

# Proper Scheduling

- Total Run Time
  - Irrigation time needed to meet plant needs
  - Influenced by:
    - Irrigation Water Requirement
    - Precipitation Rate
- Example
  - 1.5"/ week Irrigation Water Requirement
  - 0.5"/hour PR

$1.5 \div .5 \times 60 = 180$  minutes per week

# Proper Scheduling

- Irrigation Days
  - Number of days per week irrigation will occur
  - Influenced by:
    - Plant Water Requirement
    - Allowable Depletion
- Example
  - 1.2" per week Plant Water Requirement
  - 0.36" Allowable Depletion

$1.2 \div 0.36 = 3.33$  or 4 Days

# Proper Scheduling

- Run Time per Irrigation Day
  - ▣ Minutes irrigation system will water per irrigation day
  - ▣ Influenced by:
    - Total Run Time
    - Irrigation Days
- Example
  - ▣ 180 minutes/week Total Run Time
  - ▣ 4 Days/week

$$180 \div 4 = 45 \text{ minutes per day}$$

# Proper Scheduling

- Run Time per Cycle
  - Time irrigation system can water before runoff
  - Influenced by:
    - Soil Intake Rate
    - Precipitation Rate
- Example
  - 0.2"/hour Intake Rate
  - 0.5"/hour Precipitation Rate
$$0.2 \div 0.5 \times 60 = 24 \text{ minutes}$$

# Proper Scheduling

- Cycles per Day
  - Start times per day needed to avoid runoff
  - Influenced by:
    - Total Run Time per Day
    - Run Time per Cycle
- Example
  - 45 minutes of Total Run Time per Day
  - 24 minutes max. Run Time per Cycle

$45 \div 24 = 1.88$  or 2 @ 23 minutes each

# Proper Scheduling

- Base Schedule for 1 week
  - 4 Days per Week
  - 46 Minutes per Day
  - 2 Start Times per Day
  - 23 Minutes each Cycle
- Meets Plant Water Requirement
- Avoids Runoff

# Implement a Base Watering Schedule

- Watering Schedule Adjustments
  - ▣ Create a base schedule for periods during the growing season
    - Weekly
    - Monthly
  - ▣ Adjustments to the schedule due to:
    - Weather
    - Landscape Appearance
    - Water use

# Implement a Base Watering Schedule

- Use Available Controller Technology
  - Multiple Programs and Multiple Start Times
  - Water Budget or Percent Adjust
  - Rain Sensors
  - Smart Controllers



# Landscape Water Management

- Good water managers must understand:
  - ▣ Plant water requirements
  - ▣ Soil characteristics
  - ▣ Irrigation system performance
- Good water managers must:
  - ▣ Create/Implement/Adjust water application
  - ▣ Properly maintain the irrigation system
  - ▣ Track water use



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