# CRANBERRY IRRIGATION WATER MANAGEMENT

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Irrigation water management is the process of determining and controlling the volume, frequency, and application rate of irrigation water in a planned, efficient manner. A properly operated, maintained, and managed sprinkle irrigation system is an asset to a cranberry farm. Low-technology assessment methods and tools are available to assist the irrigation manager to determine maintenance, reconstruction, and replacement priorities and to operate the existing system to manage soil moisture to promote the desired crop response, optimize use of available water supplies, decrease non-point source pollution of surface and groundwater resources, and manage air, soil, and plant micro-climates.

## Simple System Assessments and Maintenance

Determine Sprinkler Makes/Models and Spacing

- Generally, sprinklers on a given lateral line should be of the same model and contain the same nozzle size
- Having a variety of heads/nozzles causes variable [typically poor] uniformity, which results in variable frost protection and decreased pumping plant efficiency, while complicating irrigation water management—How much water are you actually applying?

Check for Nozzle Wear – use the shank-end of a high-speed drill bit

Check Operating Pressure

- Use a handheld pressure gauge with *Pitot* tube
- Check the first sprinkler or two on beds near the pump, far from the pump, and in-between—consider checking every other bed or every third bed if the sprinkler system is similar from bed to bed

Measure Sprinkler Output

- Use a small piece of hose, a bucket of known volume, and a stopwatch or watch with a second hand
- Compare measured output from worn nozzles to published/calculated values and consider replacing nozzles if measured output exceeds published/calculated output by ~0.5 gpm

Calculate Sprinkler Output and Average Application Rates

- Average Application Rate = (Q × 96.3) ÷ A, expressed in inches/hour,
  where Q = sprinkler discharge (in gallons per minute),
  and A = distance between laterals (in feet) × distance between sprinklers (in feet)
- Rainbird™ calculator: http://www.rainbird.com/calculators/calculators.htm

Check for and Repair Leaky Pipelines

Determine Your Soil's Water Holding Capacity – submit a sample for testing or refer to published values

## Detailed System Assessments

Determine Uniformity ("bucket test") and Estimate Application Efficiency

## Uniformity vs. Efficiency

Application Efficiency ($E_a$) is the percentage of water delivered to the field that is used by the crop

- $E_a$ is difficult to measure
- Potential $E_a$ for a well managed system is perhaps 70% to 85%
- Actual $E_a$ can be much lower…due to poor design (low uniformity) or poor management (over-application)
- To improve:
    - Improve uniformity (see below)
    - Maintain irrigation infrastructure (pump, pipelines, sprinklers)
    - Practice Irrigation Water Management

Distribution Uniformity (DU) is the percentage of the average application amount received in the least-watered quarter of the field

- Measured via catch-can test or estimated using a computer program, such as SPACE Pro™
- Spatially variable within a field and, probably more so, across beds on a given pump
- Influenced by design (spacing, heads, nozzles, risers, etc.), operating pressure, and condition of irrigation hardware (nozzle wear, leaky mainline, etc.)
- Wisconsin cranberry systems are variable: from DU<50% to DU>85%
- To improve:
    - Replace worn nozzles
    - Repair leaky pipelines
    - Operate at the proper pressure for your system
    - Replace or retrofit the existing system

Key Points:

- ✓ Uniformity and efficiency are not synonymous
- ✓ High uniformity does not ensure high efficiency…management is the key
- ✓ Poor uniformity limits potential application efficiency and makes management more challenging

## NRCS Standards for New Irrigation Systems

DU ≥ 76% and Christiansen Coefficient of Uniformity (CU) ≥ 85%

- 50’ x 60’ systems can meet this requirement
- 50’ x 40’ or 40’ x 50’ routinely meet this requirement

Velocity of flow in pipelines must be designed to not exceed 5 ft/sec
All NRCS Conservation Practice Standards can be downloaded from the Electronic Field Office Technical Guide (eFOTG), which can be found on the Wisconsin NRCS website: http://www.wi.nrcs.usda.gov/

## Additional Information

Procedures for conducting a detailed assessment of your irrigation system are available from the Wisconsin Cranberry Crop Management Library (http://www.hort.wisc.edu/cran/). Follow the “Conservation Planning” link to the “Irrigation Water Management” section. Consider contacting an NRCS technical specialist for assistance with conducting an assessment of your irrigation system and developing an irrigation water management plan.