



# IRRIGATION WATER MANAGEMENT

---

**THE GOALS OF IRRIGATION WATER MANAGEMENT INCLUDE REDUCING CROP STRESS, OPTIMIZING YIELD AND REDUCING LOSS OF NUTRIENTS FROM THE ROOT ZONE.** Maintaining the right soil moisture ensures that you get the greatest benefits from your investment in an irrigation system.

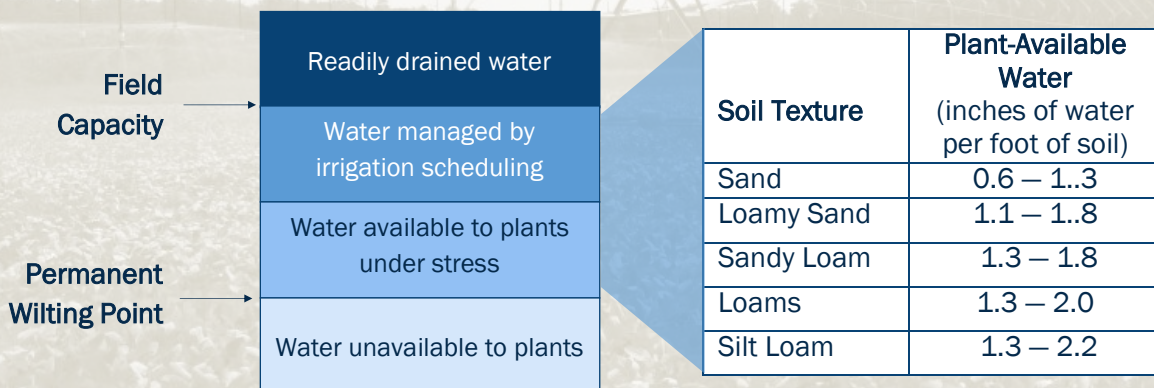
# WHAT ARE THE BENEFITS?

**Increased Yields-** Irrigation helps to improve yield by maintaining ideal soil moisture conditions and reduce the risk of crop failure due to insufficient rainfall.

**Increased Nutrient Use Efficiency-** Properly-managed irrigation systems optimize the investment in the system through efficient use of fertilizer, water and energy. More consistent yields, particularly in dry years, ensures maximum uptake of nutrients by the crop and thus reduce nutrient losses to the environment which helps to improve water quality.

## WATER MANAGEMENT BASICS

The goal of irrigation water management is to maintain the right soil moisture level—sufficient to avoid plant stress without exceeding field capacity. The range between these two points varies according to soil texture and hydrology.



The water-holding capacity of your soil determines how much you should apply when you irrigate. Applying more water than your soil can store in a single pass will cause water and nutrients to be lost by running off the surface or moving below the root zone to the groundwater. **Smaller, more frequent irrigation events result in better nitrogen use efficiency than larger, less frequent events.**

# IRRIGATION SCHEDULING

## FACTORS IN THE CHECKBOOK METHOD

Beginning Water Balance

- Crop Water Use

+ Effective Rainfall

+ Net Irrigation

= Current Soil Water Balance

**Checkbook Methods** use evapotranspiration and crop water-use curves to calculate and track the daily water balance in the soil. The checkbook method can be paper-based, spreadsheet-based, or computer model-based (such as the Delaware Irrigation Management System, available for free online at [deos.udel.edu](http://deos.udel.edu)).

Crop water use through evapotranspiration isn't an exact science, and there are a number of assumptions that may result in calculation error. In addition, crop curves don't account for management or site factors such as variety, population, or compaction. Checkbook method users should visit the field often and make any needed adjustments to the balance.

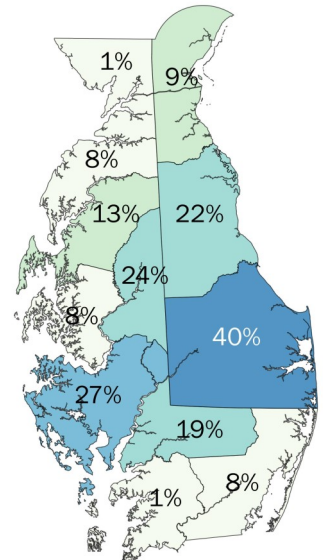
**Soil Moisture Methods** include soil moisture sensors, tensiometers and the feel & appearance method. The feel method is qualitative and takes experience to correctly assess soil moisture. Tensiometers and soil moisture sensors require a considerable investment to set up and maintain, but provide real-time measurements of soil moisture. These tools can complement the checkbook method, or be used on their own to trigger irrigation events.

When considering where to set the threshold for an irrigation event, wetter is not necessarily better. A recent study by the University of Delaware did not demonstrate a significant yield difference among multiple irrigation treatments, except for a slight yield drag from the wettest scenario.

## IS YOUR SYSTEM CALIBRATED?

Out of 400 irrigation systems that the University of Delaware evaluated for uniformity, efficiency and application rate, **over 50% of the systems applied less than 80% of the water estimated** by the system manufacturer's calibration chart.

## IRRIGATED CROPLAND



Overall, 20% of the cropland in DE and MD's Eastern Shore is irrigated. (2012 Ag Census)

## NRCS PRACTICES

### ENVIRONMENTAL QUALITY INCENTIVE PROGRAM (EQIP) PRACTICES:

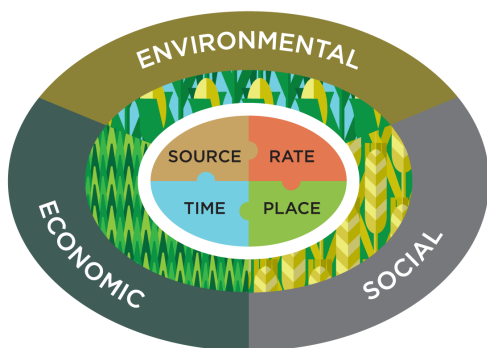
- Irrigation Water Management (449)

### CONSERVATION STEWARDSHIP PROGRAM (CSP) ENHANCEMENTS:

- E449114Z5 & E449144Z5- Complete pumping plant evaluation for all pumps on a farm
- E449114Z8- Advanced Automated IWM– Year 1, Equipment and soil moisture or water level monitoring
- E449114Z7- Advanced Automated IWM– Year 2-5, soil moisture monitoring

## RESOURCES

- **DELAWARE ENVIRONMENTAL OBSERVING SYSTEM AND DELAWARE IRRIGATION MANAGEMENT SYSTEM**  
Rainfall and evapotranspiration data for sites throughout Delaware. DIMS is a free online tool based on the Checkbook Method. Available online at [deos.udel.edu](http://deos.udel.edu)
- **NRCS GUIDE– ESTIMATING SOIL MOISTURE BY FEEL AND APPEARANCE:** Available online at <http://tinyurl.com/feelmethod>



**THE DELAWARE MARYLAND 4R ALLIANCE (DM4RA)** is a collaboration between agribusinesses, government agencies, conservation groups and scientists working together to ensure that every nutrient application on Delmarva is consistent with the 4Rs– the Right Nutrient Source, applied at the Right Rate, at the Right Time, in the Right Place.

Founded by The Nature Conservancy and the Delaware-Maryland Agribusiness Association, we support the increased implementation of 4R practices, to benefit the economic, environmental and social well-being of our region and our farmers.

CONTACT: Keiller Kyle, Agricultural Specialist  
(315) 730-7454, [keiller.kyle@tnc.org](mailto:keiller.kyle@tnc.org)

[WWW.4RMIDATLANTIC.COM](http://WWW.4RMIDATLANTIC.COM)