‘FEEL AND APPEARANCE METHOD’ QUICK WAY TO ESTIMATE SOIL MOISTURE

Knowing the amount of moisture present in soil is important whether managing a backyard garden or 20 acres of irrigated hay.

Soil with too little moisture will not support adequate plant growth, yet over-saturated soil may hinder plant growth and potentially mean water is being over applied and wasted.

Various devices can measure soil moisture (see Summer 2018 Barnyards & Backyards article “Soil moisture sensors boost irrigation effectiveness”) or you can learn how to manually estimate the amount of moisture in the soil. This method, called the “feel and appearance method,” takes a little research and practice but can make irrigating more efficient.

Soil types are key to how often to water

Each soil has a different texture. These different textures provide clues on how irrigation should occur – they affect how fast water infiltrates the soil, how long the water takes to drain out, and various other properties. Soils are made up of the soil particles and the spaces in between particles, known as soil pores. Part of soil texture is created by how these particles and spaces are sized and arranged.

Coarse textured soils

Coarse textured soils, such as sandy soils, tend to have comparatively large pore spaces between their particles, known as macropores. Macropores provide an area where water can sit that is easy for plant roots to access, yet coarse textured soils cannot hold as much water as finer textured soils, such as clay soils (which have more surface area on their particles in total where water can cling). These sandy type soils are depleted of water much faster than finer textured soils, yet on the flip side can be refilled much faster than finer textured soils.

dommtsky, Shutterstock

Get too much water too often in your fields? USDA's Natural Resources Conservation Service Wetland Reserve Enhancement Partnership (WREP) program can provide assistance to qualified landowners. Visit bit.ly/wrephelp for more information.

Finer textured soils

Finer textured soils, such as clays, tend to hold more water in lots of micropores but do so more tightly. Some plant roots can have difficulty accessing the water.

The chart on page 9 demonstrates the amount of water available to plants depending on the soil texture. The amount available increases or decreases depending on texture.

Estimating soil water availability

You will need to determine the kind of soil to get an idea of how water will behave in your soil and to learn to visually estimate water content. A previous Barnyards and Backyards article outlines this process bit.ly/wyosoiltexture. Or see "The Old Saying 'Dull As Dirt' Doesn't Apply Here" in the Fall 2014 Barnyards & Backyards edition.

Once the soil type is determined, how do you visually estimate the percent water available (and thus if it is time to water)? The USDA's Natural Resources Conservation Service (NRCS) has developed a tool to help. Program Aid Number 1619 (link below) outlines using the "feel and appearance method" for estimating the percent of water available, dependent on soil texture. For best results, estimate the percent water available at different depths in your soil's profile depending on the crop and soil profile for your property.

To begin, use a shovel or probe to collect a small amount of soil. Squeeze the soil tightly in your hand several times. This should form an oblong ball of soil (see below). The appearance of this ball will allow you to estimate the water available. The guide provides pictures to help with the estimation process. Depending on the soil texture, how the ball is formed and the manner in which the soil sticks to your fingers provides answers for the estimated soil available water content.

Sandy loam example

Figure 1
50-75 percent available water .9-0.3 in/ft depleted: Moist, forms a ball, with defined finger marks, very light staining on fingers, darkened color, pliable, will not stick.

Figure 2
75-100 percent available water 0.4-0.0 in/ft. depleted: Wet, forms a ball with well-defined finger marks, light to medium staining on fingers, make weak ribbon between thumb and forefinger.

How to use the estimate

The estimate of the available water for a particular soil can be used with the guide to determine the number of inches per feet of water depleted (in/ft of water that has been removed by evaporation, plant roots, etc.). The in/ft depleted is great information because this provides the number of inches of water needed per foot of soil to refill the soil to field capacity.

Let's run through an example using the guide for a sandy clay loam textured soil. You collect a small ball of soil, place it in your hand and squeeze tightly several times. From the oblong ball formed you determine it is slightly moist, it forms a weak ball (can easily be broken) with rough surfaces, there is no water staining on your fingers, and a few of the aggregated soil grains break away and fall off the ball.

From the guide, you would determine the soil has 25-50 percent water available. You would need to add 0.8-1.6 inches of water per foot of soil to bring the soil to field capacity. The same procedure would be used for different textured soils and different water availability estimates.

While not an exact science, the "feel and appearance method" is a way to quickly estimate soil water content. As summer's warmer temperatures place more plants at risk of water stress, the soil water content estimation guide is a useful resource to make sure your plants have plenty of water available. To find a copy of the guide, please visit bit.ly/moisturebyhand or contact your local NRCS office.

Fine textured, coarse textured – soils can't hide important information from **Brian Sebade**. He is a University of Wyoming Extension educator based in Albany County and serving southeast Wyoming. He can be reached at (307) 721-2571 or at bsebade@uwyo.edu.

How do I know when to irrigate?

by Caleb Carter

Determining when to irrigate is the second part of irrigation scheduling. This is based on the moisture-holding capacity of the soil and the rooting depth of the crop. The amount of water the soil can hold is dependent on the texture (the percentage of sand, silt, and clay). While the units are less important, Figure 1 shows how soil texture affects water-holding capacity.

Pretend your field is like a sponge. Place the sponge in water. The sponge is dripping water when pulled out, representing the water lost to runoff from your field or drainage below the root zone. Once it stops dripping water, your field/sponge has reached "field capacity" (the maximum amount of moisture it can hold; in the field it typically takes about 24 to 48 hours following an irrigation or heavy rain event to reach this point). If you wring out the sponge, the water that comes out of it is considered the plant available water (PAW). After completely wringing out the sponge, it's still damp, but no more water will come out. This is the permanent wilting point. This is the point at which the plant can no longer extract any water from the soil, and it will die due to a lack of water if the field is not irrigated. So the soil in your field can contain water but if the amount of water it contains is not above the Permanent Wilting Point, the plants will still die.

To avoid stressing the crop, maintain the soil moisture at or above 50 percent of the PAW. This is referred to as the Management Allowable Depletion (MAD). Due to the longer time necessary to apply water in low-flow (micro or drip) irrigation systems, the MAD should be 25 to 30 percent of the PAW.

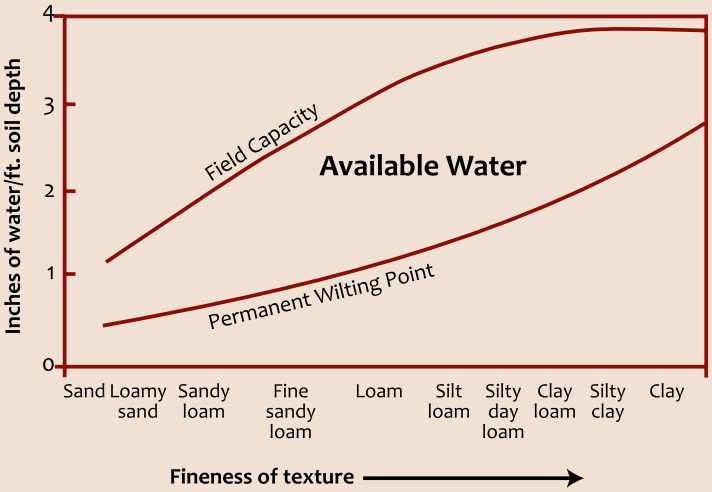

***Figure 1**. Plot showing available water capacity over a range of soil textures. Available water is calculated as the difference, in inches of water per foot of soil depth, between field capacity and permanent wilting point, divided by 12 to convert to a fraction. (Ohio Agronomy Guide, 14th Edition, Bulletin 472-05)*