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Estimating Soil Moisture by Feel and Appearance

Irrigation Water Management (IWM) is applying water according to crop needs in an amount that can be stored in the plant zone of the soil.

The feel and appearance method is one of several irrigation scheduling methods used in IWM. It is a way of monitoring soil moisture to determine when to irrigate and how much water to apply. Applying too much water may cause excessive runoff and/or deep percolation. As a result, nutrients and chemicals may be lost or leached into the ground water.

In applying this method, you determine the amount of irrigation water needed by subtracting water in soil storage (estimated using the feel and appearance method) from the available water capacity (AWC) of the soil. (See the example computation below.)

The feel and appearance of soil varies with texture and moisture content. Water available for plant use can be estimated, with experience, to an accuracy of about 5 percent. Soil moisture is typically sampled in

1-foot increments to the root depth of the crop at three or more sites per field. You vary the number of sample sites and depths according to: crop, field size, soil texture, and soil stratification. For each sample the feel and appearance method involves:

1. Obtaining a soil sample at the selected depth using a probe, auger, or shovel;
2. Squeezing the soil sample firmly in your hand several times to form an irregularly shaped ball;
3. Observing soil texture, ability to ribbon, firmness and surface roughness of ball, water glistening, loose soil particles, soil/water staining on fingers, and soil color;
4. Comparing observations with photographs and/or chart to estimate percent water available. (Note: A very weak ball disintegrates with one bounce of the hand. A weak ball disintegrates with 2 to 3 bounces.)

Example for a uniform soil

Sample depth (inches)	Zone (inches)	USDA texture	Field capacity* (percent)	AWC for layer (inches)	Water available (inches)	Water need (inches)
6	0-12	sandy loam	30	1.4	.42	.98
18	12-24	sandy loam	45	1.4	.63	.77
30	24-36	loam	60	2.0	1.20	.80
42	36-48	loam	75	2.0	1.50	.50
				6.8	3.75	3.05

* Determined by feel and appearance method

Summary of estimation

	(inches)
AWC in 48" root zone at 100% field capacity	6.8
Actual water available for plant use	3.7
Net irrigation requirement or need	3.1

Fine sand and loamy fine sand soils

Appearance of fine sand and loamy fine sand soils at various soil moisture conditions.

Available water capacity 0.6–1.2 inches/foot

Available Soil Moisture	Description	Illustration
0-25	Appears dry, will hold together if not disturbed, loose sand grains on fingers.	
25-50	Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remain on fingers.	
50-75	Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, light uneven water staining on fingers.	
75-100	Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon.	
100 (field capacity)	Wet, forms a weak ball, light to heavy soil/water coating on fingers, wet outline of soft ball remains on hand.	

Sandy loam and fine sandy loam soils

Appearance of sandy loam and fine sandy loam soils at various soil moisture conditions.

Available Water Capacity 1.3–1.7 inches/foot

Available Soil Moisture	Description	Illustration
0-25	Appears dry, forms a very weak ball, aggregated soil grains break away easily from ball.	
25-50	Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers.	
50-75	Moist, forms a ball with defined finger marks, very light soil/water staining on fingers, darkened color, will not slick.	
75-100	Wet, forms a ball with wet outline left on hand, light to medium staining on fingers, makes a weak ribbon.	
100 (field capacity)	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers.	

Sandy clay loam and loam soils

Appearance of sandy clay loam and loam soils at various soil moisture conditions.
 Available Water Capacity..... 1.5–2.1 inches/foot

Available Soil Moisture	Description	Illustration
0-25	Appears dry, soil aggregations break away easily, no staining on fingers, clods crumble with applied pressure.	
25-50	Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away.	
50-75	Moist, forms a ball, very light staining on fingers, darkened color, pliable, forms a weak ribbon.	
75-100	Wet, forms a ball with well defined finger marks, light to heavy soil/water coating on fingers, ribbons between thumb and forefinger.	
100 (field capacity)	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, thick soil/water coating on fingers.	

Clay, clay loam and silty clay loam soils

Appearance of clay, clay loam and silty clay loam soils at various soil moisture conditions.

Available Water Capacity 1.6–2.4 inches/foot

Available Soil Moisture	Description	Illustration
0-25	Appears dry, soil aggregations separate easily, clods are hard to crumble with applied pressure.	
25-50	Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure.	
50-75	Moist, forms a smooth ball with defined finger marks, light staining on fingers, ribbons between thumb and forefinger.	
75-100	Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily.	
100 (field capacity)	Wet, forms a soft ball, free water appears on soil after squeezing or shaking, thick soil/water coating on fingers, slick and sticky.	