

Calculating a Soils Percent of Water at Field Capacity and the Percent of Field Capacity

Oven dry a soil sample at 70 C for 1 or two days, or microwave until it loses no more weight. This is the Dry Weight of the soil.

Determine the Wet Weight of the soil or water holding ability of the soil. Use a container with one eighth inch (3 mm.) diameter holes punched in the bottom. To a known weight of soil (example 453.6 grams or 1 pound) mix in water until it drips out the holes in the bottom. Place a lid on the container of saturated sample and let set overnight; then reweigh. Remember not to include the weight of the container. Three or four samples should be used and an average calculated. For example the samples averaged 557.93 grams.

Step 1. Wet weight of soil - dry weight of soil = X

Step 2. $\frac{X}{\text{dry wt. of soil}} (100) = \text{Percent of water at field capacity}$

Substituting the example weights from above.

Step 1. $557.93 - 453.6 = 104.33$

Step 2. $\frac{104.33}{453.6} (100) = 23 \text{ percent of water at field capacity}$

The final phase is to obtain samples of soil from the root zone of the crop and determine the percentage of moisture in the soil in relationship to the field capacity. This is the percent of field capacity. Weigh the soil samples then oven dry until no further weight is lost. Follow steps 1 and 2.

Step 1. Wet weight (526.63) - dry weight (453.6) = X (73)

Step 2. $\frac{73}{453.6} (100) = 16.1 \text{ percent of dry weight}$

To express this as a percentage of the field capacity follow step 3.

Step 3. $\frac{\text{Percent of dry weight}}{\% \text{ of water at field cap.}} \text{ or } \frac{16.1}{23.0} = 70 \% \text{ of field capacity}$

Once the field capacity of the soil is known it is possible to compute the amount of water to add to dry soil to obtain a desired percentage of the field capacity. For example, 356 grams of dry soil multiplied by a known field capacity of 26 percent equals 92.56 ml. of water. If 70 percent of the field capacity is desired, 92.56 by .70 equals 64.79 ml. of water to mix with 356 grams of soil. For 40 percent of field capacity, $.40 \times 92.56 = 37$ mls. of water. A word of caution: water is convertible from mls. or cc. to grams; but soil is not. Once the soil is wet it compacts, which adds to the problem.