

Irrigation Management Using the Small Grain Advisory

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The Small Grain Advisory can be used as an aid for decisions regarding irrigation amount and timing. Crop water use estimates provided by the advisory, divided by an irrigation efficiency, can serve as a guideline for the amount of irrigation water that should be applied, particularly with drip or sprinkler irrigation systems. With flood or furrow systems, the advisory is more useful for irrigation timing since the minimum amount of water applied by these systems is usually more than the amount needed.

The Small Grain Advisory can be used to schedule small grain irrigation using the Water Balance Method. This method involves estimating soil water depletion as the difference between crop water use and effective rainfall, and irrigating when soil water depletion in the active root zone reaches a critical level. The Advisory provides crop water use and rooting depths for 2-week periods. The maximum allowable soil water depletion is usually set around 50% of available water holding capacity for small grains, but may be decreased to 35% if water is inexpensive, or may be increased to 65-80% before jointing or after soft dough due to increased resistance to water stress at these stages. Available water holding capacity varies according to soil texture (see table below). A period of 2 days is usually allowed after irrigating before water use is summed to account for drainage.

Available water holding capacity for various soil types averaged from Arizona soil survey information.

Soil texture	Available water holding capacity (inches/ft)
Sand	0.85
Sandy loam	1.38
Sandy clay loam	1.73
Loam	1.94
Silty clay loam	2.30

Example - Critical depletion level

Calculate the critical depletion level of available water holding capacity given the following:

- 1) Available water holding capacity = 1.73 inches/ft (sandy clay loam),
- 2) Active rooting depth = 3.0 feet,
- 3) Maximum allowable depletion = 50% or 0.50.

Critical depletion level

$$\begin{aligned} &= (\text{Available water per ft}) \times (\text{rooting depth in ft}) \times (\text{maximum allowable depletion}) \\ &= (1.73 \text{ inches/ft}) \times (3.0 \text{ ft}) \times (0.5) = 2.6 \text{ inches} \end{aligned}$$

Example – Soil water depletion

Calculate soil water depletion from the most recent irrigation through Feb 28 given the following:

- 1) The most recent irrigation was applied on Feb 1,
- 2) Water use from Feb 1 – 14 is 1.12 inches (0.08 inches/day),
- 3) Water use from Feb 15 – 28 is 1.40 inches (0.10 inches/day),
- 4) 0.2 inches of rainfall was recorded on Feb 21.

Soil water depletion

$$\begin{aligned} &= (\text{Crop water use [excluding 2 days after an irrigation]}) - (\text{effective rainfall}) \\ &= (0.08 \text{ inches/day} \times 12 \text{ days})_{\text{Feb 1-14}} + (1.4 \text{ inches} - 0.2 \text{ inches rain})_{\text{Feb 15-28}} \\ &= 2.16 \text{ inches} \end{aligned}$$