
Irrigation Water Management
Sarah Sommerfeld PAg
Irrigation Branch, Saskatchewan Ministry of Agriculture
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Irrigation water management or irrigation scheduling ensures that water is consistently available to the plant and that it is applied according to crop requirements. Effective irrigation management will improve water use efficiency, optimize crop yield potential and maximize crop quality. In addition, irrigation management will minimize water losses through deep percolation and run-off which reduces pumping costs and minimizes negative environmental impacts.

To effectively schedule irrigation applications, an irrigator must know four critical information items –

1. soil texture
2. water holding capacity of the soil
3. soil moisture content and
4. crop water use at specific development stages.

A soil is considered to be saturated when the entire pore volume is filled with water. Field capacity of a soil is defined as the maximum amount of water that remains in the pore spaces of each soil type after the effects of gravity cease. Soils with a greater proportion of coarse particles (sand) drain faster than fine particle soils (clay). The permanent wilting point of a soil is the point at which the water in the soil is no longer available to the plant, as the water is bound too strongly to the soil particles and is inaccessible for plant use.

Available water, also known as available moisture, is the amount of water in a soil between field capacity and permanent wilting point, that is used for crop growth and cooling. Not all available water is able to be utilized equally by a plant. As the amount of water in the soil moves closer to permanent wilting point, the plant has more difficulty accessing the water. The top half of available water is called readily available water and can be freely accessed by a plant.

The amount of irrigation a crop requires relates to the type of crop grown, selected variety, development stage, target yield, crop management and climatic conditions. Seasonal crop water use or seasonal evapotranspiration is the amount of water used by a plant for growth and cooling processes. Daily evapotranspiration rate increases as the crop grows and reaches a maximum use per day during the critical periods of flowering and seed set, or for perennial forage crops, after cutting or grazing.

The rooting zone influences the amount of water available to the crop. Crops with shallow rooting depths have a smaller root zone from which water can be extracted. As such, irrigation water management of shallow rooted crops requires more diligence than is needed with deep rooted crops; also crops vary in their ability to extract water from the soil. To adjust for this allowable depletion rates are established for each crop. The allowable soil water depletion limit, also termed allowable depletion, is the crop specific amount of water that can be removed from the soil profile prior to a crop suffering moisture stress.

The intent of irrigation water management is to keep the available soil moisture between field capacity and the allowable depletion limit for a specific crop during development. As a crop progresses through development the amount of water it requires changes, resulting in the need to adjust irrigation applications accordingly. Weekly monitoring of available soil moisture coupled with referencing crop water requirements will assist in determining timing and amount of an irrigation application.

The Saskatchewan Ministry of Agriculture publication *Irrigation Scheduling Manual* can provide an irrigator with the necessary procedures and reference material to improve irrigation water management on his/her farm. To obtain a copy of the publication, please contact the Irrigation Branch office in Outlook at (306) 867-5500 or visit the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca.