

Introduction to Crop Waste Use and Irrigation Scheduling

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Determining when and how much to irrigate may seem like a baffling task. Using a systematic approach to irrigation scheduling, however, will likely result in multiple benefits including better crop performance and increased profits. A calendar approach to irrigating may not reflect actual crop needs for water through the season. Inadequate irrigation may result in lost yield potential. Excessive irrigation may result in poor crop performance and quality, as well as groundwater pollution from leached fertilizer and pesticides. Providing the right amount of water at the right time results in optimal yields and quality, saves on energy, labor, and fertilizer costs and protects ground water quality.

Understanding how plants, soil and water interact may help demystify irrigation scheduling. Your soil is a complex system of solid particles and pore spaces. The spaces can be filled with air or water. When water is added through rainfall or irrigation, the air spaces become filled with water and the soil may become saturated. A truly saturated soil will only temporarily hold this maximum volume of water. Some of the water will drain under the force of gravity.

When a saturated soil has drained under the force of gravity, it is considered to be at field capacity. At that point, some of the pores contain water and other larger ones are filled with air. Plant roots generally need both air and water to survive and function. At field capacity, the remaining water is held by electrostatic forces between the water molecules and the soil particles. Crops vary in their ability to extract this remaining water before becoming stressed. For example, fruit trees can extract approximately half of this remaining soil water without becoming stressed.

Water is removed or lost from the soil through evaporation, plant transpiration, and deep percolation. The combined loss of moisture from the soil through evaporation and plant transpiration is called evapotranspiration or ET. Solar energy is the main driving force for ET. Consequently, water demand by crops varies seasonally. For perennial crops like fruit trees, demand typically starts out low in April when trees have little or no foliage, temperatures are cool, and humidity is high. Tree needs increase gradually to a peak in late July and early August and then decrease through the rest of the season. Applying the same amount of water during irrigation cycles through the season may result in over or under irrigating.

Most approaches to irrigation scheduling involve estimating the amount water lost through ET and applying that amount of water plus an additional amount that depends on the efficiency of a given irrigation system. This approach can be combined with some simple soil moisture monitoring procedures to closely estimate how much water is needed to bring the soil to field capacity.

Resources to help you gather the necessary information and guide you through the process are listed below. These publications are available from the OSU Extension office in your county or on the World Wide Web at <http://eesc.orst.edu/>.

Resources:

Western Oregon Irrigation Guides, EM8713

Simple Irrigation Scheduling Using the "Look and Feel" Method, EM 8716

Irrigation Scheduling, PNW 288

Oregon Crop Water Use and Irrigation Requirements, EM 8530