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# Excel-Based Computational Template for Irrigation Scheduling Using Dual Crop Coefficients

**Abstract**

We developed an Excel-based computational template Extension educators can use to assist clientele with scheduling irrigation for efficient use of water. With the template, the user applies the dual crop coefficient method to calculate evaporation and transpiration rates separately, with the result being more accurate soil water tracking as compared to what occurs when a single crop coefficient is used. Crop water needs can be conveniently calculated on the basis of soil characteristics, crop growth stages, and weather information. Application examples demonstrate that the amount and frequency of irrigation should be adjusted according to soil texture. The template and application examples are available to Extension professionals as electronic supplementary material.

**Keywords:** irrigation scheduling, dual crop coefficients, FAO-56 method, Excel template, Penman-Monteith equation

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## Introduction

Evapotranspiration (ET) controls the moisture content of soil, one of the most important freshwater storages in the earth (McColl et al., 2017). Thus, estimating the amount of water evaporated from soil and transpired from vegetation is a necessary process in many engineering and science fields, such as agricultural water management, water resources planning, and hydrologic analysis. A convenient way to calculate an actual ET rate for crop plants ($ET_c$) is to use a crop coefficient ($K_{cb}$) method based on a reference ET rate estimate and the types of plants located in an area of interest (Irmak & Haman, 2003; Morgan, Obreza, Scholberg, Parsons, & Wheaton, 2006; Zotarelli, Dukes, Romero, Migliaccio, & Morgan, 2010). There are two approaches to the crop coefficient method. With the single crop coefficient approach, the single coefficient used is the averaged effects of evaporation from soil and transpiration from vegetation for the cropped surface. With the dual crop coefficient approach,

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