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Vegetable Crop Water Use

As reductions of agricultural water allocations in central Arizona from the Colorado River are going into place in 2022 from the Tier 1 of the Drought Contingency Plan provisions, it is important for every segment of the Arizona agricultural industry to continue to review and refine our practices associated with water management and irrigation.

Seasonal conditions are a benefit to vegetable crop production and water management in the desert Southwest, both in terms of cool-season crop adaptability and the general climatic conditions that create lower environmental crop water-use demands. For example, based on more than 30 years of Arizona Meteorological Network (AZMET) data from the Yuma, Arizona area, approximately 20% of the total annual reference evapotranspiration demand typically occurs between August and May.

Reference evapotranspiration (ET_o) is the collective loss of water from a field due to evaporation from the soil surface and transpiration of water vapor from the plants. Collectively, water movement from the soil and plant systems in a field is referred to as “crop consumptive use” and it is important to understand this process in our efforts to steward our water resources most effectively.

The AZMET system provides both historical and real-time weather information that can be used to assist in crop water and irrigation management. Reference evapotranspiration values can be obtained daily from AZMET for the Yuma area and applicable to most of the region in the lower Colorado River Valley. The ET_o values multiplied by an appropriate crop coefficient (K_c) can provide very good estimates on actual crop evapotranspiration (ET_c) rates, $ET_o * K_c = ET_c$.

The appropriate K_c values are specific for each crop species and stage of growth. We commonly use crop coefficient K_c values that are provided in the publication “Consumptive Use by Major

Crops in the Desert Southwest” by Dr. Leonard Erie and his colleagues, USDA-ARS Conservation Research Report No. 29 (see attached). Reference information for K_c values can be obtained in this publication for common vegetable crops grown in this region.

Estimating and tracking actual crop-water use can be a valuable tool in understanding crop-water demand and irrigation management. Comparing actual crop-water demand and crop irrigation practices can be important in our efforts to understand crop management needs and field-level efficiencies.

Reference:

Erie, L.J., O.A French, D.A. Bucks, and K. Harris. 1981. Consumptive Use of Water by Major Crops in the Southwestern United States. United States Department of Agriculture, Conservation Research Report No. 29.