Developing Crop Coefficients for Processing Tomatoes under Subsurface Drip Irrigation

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INTRODUCTION

- Irrigated agriculture accounts for a major share of consumptive water use in the United States.
- However, with the increasing demand for water due to population growth and environmental directives as well as uncertainty linked with climate change, water allocation to the agriculture sector may be declining in the future.
- Therefore, improving on-farm water use efficiency and optimizing estimation of crop water requirements will be critical to the sustainability of irrigated agriculture.
- Crop water requirements are usually estimated by multiplying reference evapotranspiration (ETo) with coefficients specific to a particular crop (Kc).
- Coefficients have been compiled for many crops but were developed under very specific management practices that do not always reflect current cultural and irrigation practices in California.

OBJECTIVE

- Determine crop coefficients for processing tomato grown under sub-surface drip irrigation
- Develop relationship between crop coefficients and ground cover
- Determine water use efficiency

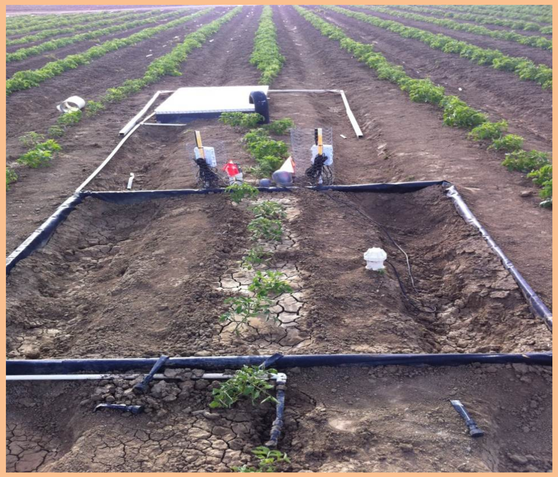

Fig. 1. Lysimeter are in the field station

Methodology

Study Description:

- Location: UC Westside Research & Extension Center- Five Points, CA
- Crop: Processing tomatoes

Irrigation:

- Sub-surface drip irrigation (12")
- When equivalent of 2 mm (0.08") crop ET measured by scale, irrigation system is turned on (100% ET)
- Surrounded field irrigated based on lysimeter ET

Measurements:

- ETc, Kc, Water application
- Ground cover
- Yield, Water use efficiency

Fig. 2. Planting in Lysimeter area

RESULTS

•Data indicated that coefficients obtained at peak season were relatively higher than those generally reported for tomatoes.

•Results also showed good correlation between fractional cover and Kc (r2 = 0.91).

•The Kc increased curve linearly until canopy reached about 75% of fractional cover.

(WUE = yield / ET_c)

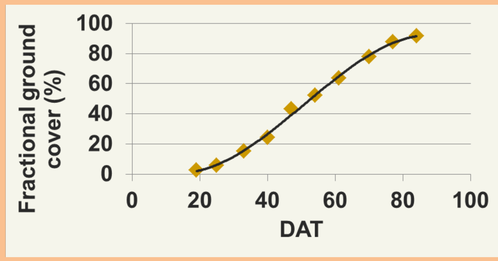

Table.1. DAT vs Fractional ground cover

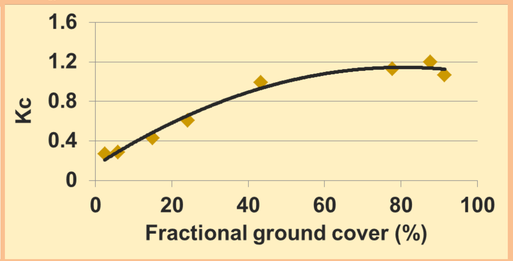

Table.2. Kc vs Fractional ground cover

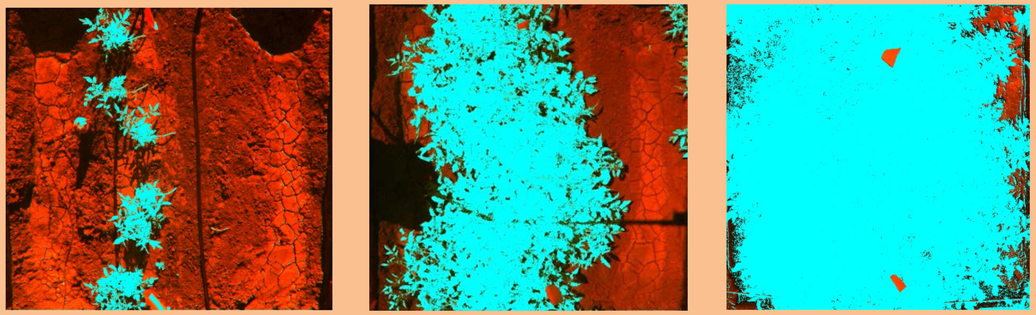

Fig.3. Fractional Ground Cover

RESULTS CONT'D

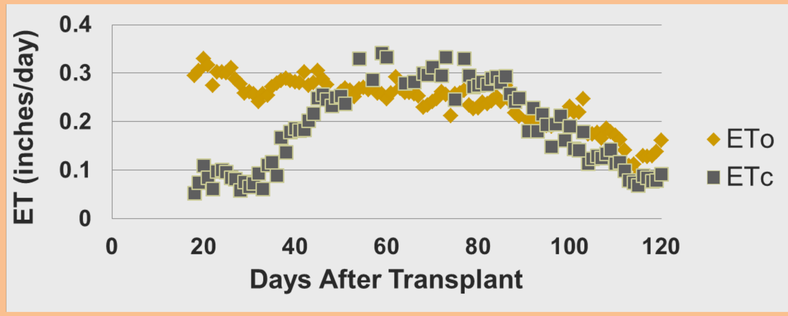

Fig.4. ET rate over time

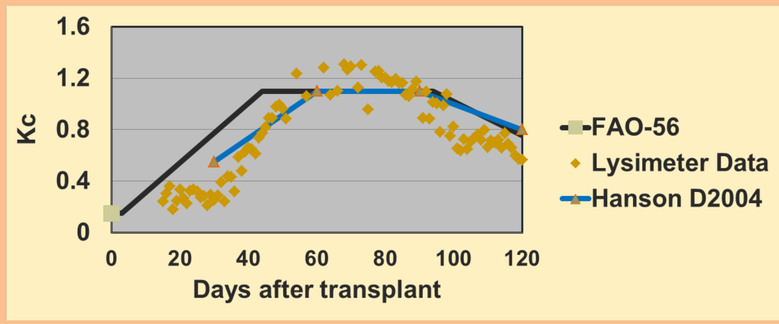

Fig.5. Kc comparison

	Tomato
Seasonal ET_c (in)	21.4
Yield (tons/ac)	38.8
Water Use Efficiency (tons/ac/in)	1.81

(WUE = yield / ET_c)

Fig.. Yield and WUE

FUTURE DIRECTION

- New Kc curve for tomato under sub-surface drip
- Relationship between Kc and ground cover; WUE
- Develop same information for new crops: biofuels
- Integrate DSS with CIMIS and Wateright
- Develop standard method for estimating irrigation scheduling

ACKNOWLEDGMENT: *Funding for this project was provided by the CSU Agricultural Research Initiative Program. The authors acknowledge the help of Dr. Denis Bacon and CSUF students.*

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