Comparison of Priestley-Taylor and FAO-56 Penman-Monteith for Daily Reference Evapotranspiration Estimation in a Humid Climate

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Introduction
- In humid climates, supplemental irrigation is needed to prevent yield reducing water stress due to the temporal rain variability and due to long-term droughts.
- The Priestley-Taylor (1972) (PT) equation has been operationally used in Georgia to compute ET for irrigation scheduling because of its simplicity, its general acceptable performance in humid regions and its limited input requirements
- Recently, FAO 56 Penman-Monteith (PM) has been found to outperform PT in humid climates.

Objective
The goal of this study was to compare the performance of PT and FAO56-PM

Materials and Methods
- Nine representative sites in Georgia, including Blairsville in a mountainous area and Savannah in a coastal area, were selected.
- Each site had at least 10 years of daily records that included minimum and maximum air temperature, solar radiation, wind speed and vapor pressure deficit.

Definitions
\( \text{ET}_o \): The FAO56-PM ET with calculated vapor pressure deficit
\( \text{ET}_{oc} \): The FAO56-PM ET with calculated vapor pressure deficit.
\( \text{ET}_{PT} \): The Priestley-Taylor ET.

Results
- PT underestimated the daily ET during the winter months in the central and southwestern areas and overestimated the daily ET during the summer months in the coastal and mountainous areas.

For the warm season, i.e., April through September, PT slightly overestimated the cumulative ET in the central

Conclusion
Based on these results it is anticipated that the use of FAO56-PM for estimating ET will standardize the ET calculations and improve irrigation efficiency in humid climates, especially for the mountainous and coastal areas.

References