

DETERMINATION OF EVAPOTRANSPIRATION OF TOMATO AND SQUASH USING LYSIMETERS IN CENTRAL SAUDI ARABIA

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ABSTRACT

Nine non-weighing reinforced concrete lysimeters were used to grow alfalfa (*Medicago sativa*) as a reference crop, and tomato (*Lycopersicon esculentum* L. cv. Tristar) and squash (*Cucurbita pepo*) as experimental crops to measure their evapotranspiration (ET_r). Crop coefficients (K_c) were estimated for tomato and squash at different stages of growth, based on lysimeter measured ET_c and reference alfalfa ET . The estimated values of K_c for tomato at four growth stages (initial, crop development, reproductive and maturity) were 0.28, 0.8, 0.96 and 0.75 and the corresponding K_c values for squash were 0.56, 0.72, 0.96 and 0.63. These K_c values of both tomato and squash were to be lower than that suggested by FAO for arid areas. Five climatological methods (FAO-Penman, Blaney-Criddle, Jensen-Haise, pan evaporation and Thornthwaite) were selected for estimating ET_c on a daily basis. An attempt was made to develop relationships between the ET_c measured by the lysimeters and that estimated by the climatological methods. Performance of the climatological methods in estimating ET_c as compared to measured ET_c were evaluated using the deviation between the values, root mean square error (RMSE) and coefficient of determination (R^2). Comparisons between various indirect methods to estimate ET_c and measured ET_c revealed that the pan evaporation method for tomato and the FAO-Penman method for squash produced the best daily estimates of ET_c .

Keywords: *Crop coefficient, water requirements, crop evapotranspiration, evapotranspiration measurements, lysimeters. © 2004 AAE*