

MONTHLY SPATIAL CALIBRATION OF BLANEY–CRIDDLE EQUATION FOR CALCULATING MONTHLY ET_o IN SOUTH OF IRAN[†]

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ABSTRACT

The Penman–Monteith equation is the most common equation for estimating reference crop evapotranspiration (ET_o). However, this equation needs full meteorological data, but few meteorological stations with complete meteorological data exist in Fars province, in the south of Iran. On the other hand, the Blaney–Criddle equation is a simpler alternative for estimating ET_o compared with the Penman–Monteith equation. In this study, the Blaney–Criddle equation was calibrated based on the Penman–Monteith equation for every month of the year by using the meteorological data of seven synoptic stations inside and seven synoptic stations outside Fars province. For this purpose, the calibration coefficients of the Blaney–Criddle equation (a and b) were determined for all months at different stations, separately. Furthermore, in a new approach the mean monthly temperature in the Blaney–Criddle equation was replaced with the effective temperature for each station in the study area. The ET_o values based on the new approach of the Blaney–Criddle equation were better than the results of the original Blaney–Criddle equation when compared to the Penman–Monteith equation as the reference equation. The calculated values of a were negative for all months and stations, and ranged between -4.84 and -0.84 . Lowest a values were obtained in May, July and June, and the highest a values were obtained in December, November and January, i.e. the values of a were greater in cold months than warm months of the year. The values of b were positive for all months and stations, and ranged between 0.71 and 1.89 . December, January and November showed the lowest b values while June, July and August showed the highest. Therefore, the values of b were greater in warm months than cold months of the year. Moreover, the range of variation of a values was larger than for the b values which implied that the a values have more impact on the estimations of ET_o . Copyright © 2008 John Wiley & Sons, Ltd.

KEY WORDS: evapotranspiration; Blaney–Criddle equation; Penman–Monteith equation; spatial and temporal calibration; Iran

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RÉSUMÉ

L'équation de Penman-Monteith est l'équation la plus commune pour estimer l'évapotranspiration de référence (ET_o). Cependant, cette équation a besoin de données météorologiques complètes mais peu de stations météorologiques avec ces données complètes existent dans la province de Fars, au sud de l'Iran. Or l'équation de Blaney-Criddle est une alternative plus simple pour estimer ET_o . Dans cette étude, l'équation de Blaney-Criddle a été calibrée sur la base de l'équation de Penman-Monteith pour chaque mois de l'année en employant les données météorologiques de sept stations synoptiques intérieures et de sept stations synoptiques en dehors de la province de Fars. À cette fin, les coefficients de calibrage de l'équation de Blaney-Criddle (a et b) ont été déterminés pour tous

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[†]Calibrage spatial et temporel de l'équation de Blaney-Criddle pour le calcul mensuel de ET_o dans le Sud de l'Iran.