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Short Communication

Crop water requirement (ETc) of sorghum at Coimbatore

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Sorghum is a model crop to utilize marginal lands for meeting energy and food demands (Bibi *et al.*, 2012). As compared to other cereal crops, sorghum is considered to be more tolerant to different stresses including drought, heat, flood and salinity. It is an important C_4 crop species with a photosynthetic mechanism that is potentially more efficient in using CO_2 (at current concentrations), solar radiation, water and nitrogen as compared to C_3 crops (Prasad *et al.*, 2006).Crop-water requirement do vary during the growing period, mainly due to variation in crop canopy, climatic condition and management techniques used. In order to avoid the under or overuse of crop water by the crop, knowledge on the exact water loss through actual evapotranspiration is necessary.The most known and used technique to estimate crop evapotranspiration or crop water requirement (ETc) is based on the Kc approach (Allen *et al.*, 1998) wherein the reference evapotranspiration (ETo) calculated using standard agro-meteorological variable are multiplied with a crop-specific coefficient (Kc). Mehta and Pandey (2015) used this methodology to compute ETc of wheat and maize in Gujarat. Considering the future food demand and anticipated water shortage, it is necessary to address the crop water requirement of sorghum which is widely grown in semi-arid climate of Tamil Nadu. Hence this study was undertaken to estimate ETc of sorghum at Coimbatore.

The daily rainfall and potential evapotranspiration (PET) data for 30 years (1981-2010) period were collected from Agromet observatory, Tamil Nadu Agricultural University, Coimbatore.To calculate ETc of sorghum three Kc values given by Allen *et al*. (1998) were used. The total crop duration of sorghum (110 days) was divided into four growth stages viz. initial (25 days), developmental stage (25 days), mid-season (30 days) and late season (30 days). The daily ETc, effective rainfall (ER) and number of irrigations required were computed by employing Gupta *et al*. (1972) water balance model. The available water holding capacity was estimated by following standard method and opening balance water balance was computed as 100 mm before sowing.

The study revealed that the seasonal water requirement of sorghum crop was 428.4mm which was 73 per cent to total PET (586.4 mm). During initial stage of 25 days, the ETc was about 35 per cent of PET and it was 74 per cent during developmental stage of growth.During mid-season stage, the ETc was 109 per cent of PET which reduced to 65.1 per cent during late season (Table 1). Sandeep *et.al*. (2017) reported water requirement of sorghum ranging between 320 to 450 mm in majority of sorghum growing regions of India.

It is interpreted that sorghum crop did use less water during its initial growth period and also during physiological maturity stage. During mid-season the ETc of sorghum was more than the PET.The leaf area index,wind turbulence and leaf temperature are possible reasons for increase incrop requirement above PET considerably.

Table1:Potential evapotranspiration (PET), crop water requirement (ETc) and effective rainfall during different stage of sorghum crop

Parameters	Initial stage (25 days)	Developmental stage (25 days)	Mid-season (30 days)	Late season (30 days)	Seasonal total (110 days)
Potential evapotranspiration (mm)	134.1	138.1	163.8	150.4	586.4
Crop water requirement (mm)	47.1	103.5	180.1	97.7	428.4
Effective rainfall (mm)	22.2	28.2	33.4	37.2	120.9

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