

PREDICTION OF SORGHUM GRAIN YIELD ADOPTING SOIL WATER BALANCE MODEL

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ABSTRACT

Eight years field study at Anantapur revealed that the grain yield of sorghum 'CSH5' varied widely between 450 and 2606 Kg/ha over the years. Soil water balance model developed by the Food and Agriculture Organisation was adopted and a close relationship between sorghum grain yield and the water used by the crop was established, accounting for 92 per cent ($R^2=0.92$) of the year to year grain yield variations. The utility of the model in predicting crop yields and the ancillary data required to improve its validity are also discussed.

INTRODUCTION

In rainfed farming, information on rainfall pattern and moisture deficits in different periods of crop growth are helpful in crop planning (Adhikari et al. 1988). The information on relationship of rainfed crop yields to varying degrees of moisture stress at different growth stages is meagre. The soil water balance model developed by Food and Agriculture Organisation (Popov 1984) combines the atmospheric water demand, rainfall, water supply ability of the soil from its stored capacity and crop water needs at different stages, and is a simple but effective measure to crop yield estimation. Hence an attempt was made in the present investigation to work out an empirical relationship between grain yields of sorghum and water use by the crop during its life cycle, adopting the said model.

MATERIAL AND METHODS

Field experiments were carried out at Anantapur under rainfed conditions during kharif season from 1977 to 1985 with a group of promising cultivars of sorghum in a randomised block design replicating thrice. The soils were red sandy loam with a pH 6.5, EC 0.15 dS/m, available N 20 kg/ha, available P_2O_5 35 kg/ha and available K_2O 340 kg/ha. The available water holding capacity was 60 mm/45 cm rooting depth. The seeds were sown at the rate of 12 kg/ha with 'gorru' giving 45 cm inter-row spacing. A uniform basal dose of 80-40-40 kg/ha of N- P_2O_5 - K_2O were given at sowing. The climatic data recorded in a class 'B' observatory situated near the experimental field were utilised in the study. The weekly values of PET

Table 2. Rainfall received, potential evapotranspiration, water needed, water used during crop period and water requirement satisfaction index of sorghum 'CSH5' at Anantapur.

Year	Rainfall received during crop period		PET mm	Water requirement of the crop mm	Water Utilised mm	Water requirement satisfaction (%)	Grain yield (Kg/ha)		
	Total mm	Weekly Mean mm					CV (%)	Actual	Estimated
1977	239.4	15.9	98.6	668.9	467.2	253.9	50.1	1680	132
1978	316.9	22.6	215.9	578.7	424.1	132.7	43.1	1280	1117
1979	413.7	27.6	145.5	493.4	336.8	264.3	78.5	2180	2147
1980	128.1	8.0	120.9	548.6	403.3	129.9	32.2	513	800
1981	380.2	25.4	95.6	458.5	315.1	315.1	100.0	2606	2772
1982	237.6	13.2	162.8	715.4	480.7	226.4	47.6	1390	1248
1984	90.6	5.3	143.6	647.9	467.1	122.7	26.3	457	629
1985	239.3	15.7	158.6	561.8	433.0	238.5	56.1	1389	1467

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