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IRRIGATION REGIMES ON GROWTH AND YIELD OF SUGARCANE

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ABSTRACT

The effect of irrigation scheduling on growth, yield and quality of sugarcane was studied at Agricultural Research Station, Bhavanisagar during 1984-87 in mid-late variety Co 6304. The results revealed that irrigating sugarcane at 0.75 IW/CPE ratio at tillering and grand growth period and at 0.5 IW/CPE at maturing phase recorded the maximum cane yield and CCS with the highest water use efficiency.

Key words: Irrigation regimes, Growth, Yield, Sugarcane.

Sugarcane is one of the most remunerative cash crops and needs 2000-2500 mm of water during the crop growth period. It has been estimated that about 250 t of water is required to produce one tonne of dry matter (Clements 1964). Mohan Naidu *et al.* (1983) have shown that moisture variation adversely affected the growth and yield of sugarcane due to reduction in tillering, economic shoot counts and number of millable canes at harvest. Chavan *et al.* (1980) reported that irrigating sugarcane crop when cumulative pan evaporation reaches 75 mm and 126 mm was on par while 225 mm CPE was found to be unfavourable. The present investigation was undertaken to study the effect of irrigation scheduling on growth and yield of sugarcane.

MATERIALS AND METHODS

Field experiments were conducted for three years during 1984-87 at Agricultural Research Station, Bhavanisagar with Co 6304 as test variety. The experiment was laid out in RBD replicated thrice during the mid season. The experimental soil was sandy loam in texture having the field capacity of 20.6 % and 8.4% as wilting moisture. The fertility status of the soil was low in available N (174 kg/ha) and P (9.4 kg/ha) and high in available K (296 kg/ha), and free from salinity and alkali hazards.

The experiment had eight irrigation treatments (IW/CPE ratios) as shown below.

	Tillering (35-100 days)	Grand growth (101-270 days)	Maturity phase (271-365 days)
T_1	0.75	0.75	0.75
T_2	0.75	0.75	0.50
T_3	0.75	0.50	0.75
T_4	0.75	0.50	0.50
T_5	0.50	0.75	0.75
T_6	0.50	0.75	0.50
T_7	0.50	0.50	0.75
T_8	0.50	0.50	0.50

Sugarcane setts collected from the healthy nursery were planted at the rate of 75,000 two budded setts/ha adopting 80 cm spacing. N, P_2O_5 and K_2O were applied as urea, superphosphate and muriate of potash at the rate of 270, 67.5 and 135 kg/ha respectively. Entire P was applied basally, N and K were applied at 30, 60 and 90 days in three equal splits. The recommended cultural practices were followed. The quantity of water required per plot was monitored through a constant discharge irrigation module. Depth of irrigation was 5 cm. Irrigation treatments were imposed from tillering phases (35 days) to harvest. At harvest, plant height, number of nodes, girth of cane, yield and CCS% were recorded and subjected to statistical scrutiny.

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RESULTS AND DISCUSSION

Plant height, nodal number, cane girth

The results revealed that plant height and number of nodes were significantly influenced by the irrigation treatments (Table 1). The highest plant height and number of nodes were recorded under T_2 (0.75, 0.75, 0.5) which was significantly superior over other treatments. Constraint moisture reduced the plant height and number of nodes greatly under T_8 where the irrigation was given at 0.5 IW/CPE throughout the crop period. Similar results were reported by Cheema and Moolani (1970) and Mohan Naidu *et al.* (1983). Girth of the cane had not been influenced significantly by the irrigation treatments.

Cane yield

The cane yield data clearly indicated that irrigating sugarcane crop at 0.75, 0.75 and 0.5 IW/CPE at tillering, grand growth and maturity phase respectively gave the highest yield. The lowest cane yield was recorded under constraint moisture (0.5 IW/CPE) throughout the crop period. This might be due to the poor growth and uptake of nutrient by the crop under moisture stress condition. The wider interval of irrigation characteristically reduced the cane yield.

Pandian *et al.* (1988) studied the irrigation needs of sugarcane at Sugarcane Research Station, Cuddalore with Co 6304 as test variety and found that scheduling irrigation to sugarcane at 85% sheath moisture level registered the highest number of economic shoots and millable canes which inturn resulted in higher cane and sugar yields than 75% sheath moisture level. This is in conformity with the findings of the present study. Similar results were reported by Mohan Naidu *et al.* (1983) and Patel and Joshi (1987).

Commercial cane sugar (CCS%)

The CCS% recorded at harvest stage which varied from 10.6 to 11.0 showed no significant difference among the treatments. According to Patel and Joshi (1987) irrigation levels had no influence on quality characters ie. CCS% in juice.

Sugar yield

The data on sugar yield revealed that higher sugar yield was recorded under T_2 which was on

Table 1. Irrigation regimes on growth, yield and quality of sugarcane (Mean of three years)

Treatments	Plant height (cm)	No. of nodes	Cane girth (cm)	Cane yield (t/ha)	Sugar yield (t/ha)	Consumptive use* (mm)	WUE (kg/ha/mm)
T_1	253	24.3	3.36	133	14.1	1932	69.0
T_2	285	28.8	3.44	139	14.7	1791	77.5
T_3	258	23.8	3.34	131	14.3	1786	73.3
T_4	249	23.4	3.32	125	13.5	1678	74.5
T_5	245	23.3	3.23	121	13.3	1817	66.5
T_6	247	23.6	3.32	123	13.5	1675	73.4
T_7	243	23.3	3.25	115	12.2	1704	67.4
T_8	237	22.3	3.29	110	11.9	1529	71.9
SED	10.06	0.57	0.08	3.24	0.40	29.1	2.33
CD	19.4	1.22	NS	6.95	1.30	62.5	5.00

* Includes 440 mm of effective rainfall

par with T_1. However, T_2 consumed less quantity of water while it was higher under T_1. There was significant reduction in sugar yield under T_8 (0.5 IW/CPE throughout the crop period). The significant variation in sugar yield could be attributed to the difference in cane yield.

Consumptive use and water use efficiency

The data on consumptive use and water use efficiency revealed that irrigating sugarcane at frequent intervals (0.75 IW/CPE throughout the crop period) consumed higher quantity of water (1932 mm) resulting in low water use efficiency. The highest water use efficiency was registered under T_2.

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