

## IRRIGATION PRACTICES FOR EFFICIENT GROWTH OF SUGARCANE ON A HIGH WATER-TABLE SOIL AT LYALLPUR

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The effect of varying irrigation regimes and methods of its application on the growth, yield and sucrose content of sugarcane variety B.L. 19 was studied. The crop was grown on a sandy loam soil with a water-table, 7 feet below ground surface and 40, 52 and 64-acre inches of water was applied by flat and furrow irrigation systems. Method of irrigation did not affect cane length, cane girth, sucrose content and total solids. The number of tillers per unit area and consequently the cane yield per acre were relatively higher in case of flat irrigation system. Furrow irrigation system, however, affected 12% saving in irrigation time. A yield of 849 maunds of millable cane could be obtained with only 40-acre inches irrigation, but for maximum production an irrigation delta of 64-acre inches was required.

### INTRODUCTION

Water-table in the Lyallpur district is steadily rising like the rest of the land between 'Doabs' and in many areas the water-table has reached 0—10 feet below the ground surface (Hussain, 1965). The upward movement of water through capillary rise was observed when the water-table reaches within ten feet of the ground surface (Hussain, 1963). The rate of upward movement of water becomes faster as the water-table rises further (Gardner and Fireman, 1958 and Hussain, 1963). Their studies suggest that part of the water requirement of a crop grown on a high water-table soil may be met from the underground water and the conventional irrigation practice on such a soil may be an unproductive and wasteful. This view was supported by Khan (1971), who observed that most of the water requirements of wheat and cotton grown on a soil with a water-table below 7 feet from the ground surface were met from underground water. This observation warrants a similar investigation on sugarcane, which is a high delta crop. The information thus developed may not only aid in re-evaluating the conventional irrigation practice for sugarcane on a high water-table soil, but also increase the efficiency of the available irrigation water. The present study was, therefore, designed accordingly.

### MATERIALS AND METHODS

The effect of varying irrigation regime and methods of its application on the performance of sugarcane variety B.L. 19 was studied. The crop was

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grown on a Lyallpur sandy loam soil with a water-table 7 feet below the ground surface and 40, 52 and 64-acre inches of water was applied by flat and furrow irrigation systems using a split plot design with four replications and a net plot size of 1/96 acre. The method and delta of irrigation were kept in the main and the sub-plots, respectively. A hundred pounds of N per acre were added to all the plots at the time of first irrigation, 35 days after sowing. Observations were made on time taken for each irrigation, cane length and girth, tillers per unit area, cane yield, total solids and sucrose content. Duncan's multiple range test at the 5 per cent probability was used to test the significance of the treatment means.

### RESULTS AND DISCUSSION

The results showed that a yield of 849 maunds of millable cane per acre was obtained with only 40-acre inches irrigation. This is 68 per cent higher than the average yield of Lyallpur District (508 maunds per acre). Increasing the irrigation delta to 52-acre inches did not affect the yield, but the yield increased significantly when the delta of irrigation was raised to 64-acre inches (Table 1). These observations suggest that although high yield of sugarcane could be obtained with lower irrigation delta (40-acre inches), yet for maximum production 64-acre inches were needed. Levels of irrigation had no measurable affect on tillering, cane length, girth, sucrose content and total solids (Table 2). These observations, differ from those of Khan (1967), who reported that moisture stress adversely affected all the aforesaid characteristics. However, in case of lower irrigation level used in this study (40-acre inches), requirement of the crop for water might have been met from the closer underground water and 10" rain that was received during the growing period of the crop.

As regards the method of irrigation; furrow irrigation resulted in an average saving of about 12 per cent in irrigation time (Table 3). This result confirms the findings of Khan (1971). Methods of irrigation did not affect the cane length, cane girth, sucrose content and total solids. However, the number of tillers per unit area and consequently the yield was relatively higher in case of flat irrigation system.

TABLE 1. Effect of method and depth of irrigation on cane yield per acre (maunds).

Delta of irrigation (acre inch)	Rainfall (inch)	Total irrigation delta (acre inch)	Yield		Average irrigation (Mds./acre inch)	Efficiency of irrigation (Mds./acre inch)
			Furrow	Flat		
64	9.73	73.73	926.3	1101.6	1013.9a(1)	15.84
52	9.73	61.73	784.9	991.3	888.1 b	17.08
40	9.73	49.73	763.9	933.9	848.9 b	21.22
Average			825.0 B	1008.9 A		

(1) Any two means not sharing a letter in common differ significantly at the 5 per cent level.

TABLE 2. Effect of method and depth of irrigation on tillering, cane length, cane girth, sucrose content and total solids.

Delta of irrigation (acre-inch)	Tillering per unit area (2'x2')	Cane length (inches)	Cane girth (cm.)	Sucrose % age	T. S
64	30.5 a(1)	76.3	2.34	15.21	17.53
52	25.8 b	71.1	2.25	15.41	17.55
40	28.1 ab	71.4	2.27	15.51	17.90
<i>Method of irrigation</i>					
Furrow	26.0 b(2)	73.0	2.29	15.33	17.54
Flat	30.3 a	72.9	2.28	15.40	17.78
		N.S.	N.S.	N.S.	N. S.

(1) & (2). Any two means not sharing a letter in common differ significantly at the 5 per cent level.

N.S. = Nonsignificant at 5 per cent probability.

TABLE 3. Time taken in hours per acre for different irrigation levels under furrow and flat irrigation methods.

Delta of irrigation (Acre-inch)	Method of irrigation		Average	% age saving in time (Furrow)
	Furrow	Flat		
64	1.195	1.392	1.293 a(1)	14.15
52	0.942	1.035	0.988 b	8.98
40	0.710	0.822	0.766 c	13.62
Average	0.949 B	1.083 A		

(1) Any two means not sharing a letter in common differ significantly at the 5 per cent level.

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