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Irrigating Corn and Grain Sorghum With Limited Water

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In 1974 we evaluated how irrigation amount and timing influenced corn and grain sorghum yields at Manhattan and Tribune. The results should help irrigators who want to use limited or less water because of limited pumping capacity, limited time, limited water supplies, increased cost of fuel for pumping, or other reasons.

At Manhattan, the study was on the Ashland Research Farm, approximately 8 miles southwest of Manhattan. The soil is Muir silt loam, which developed from river sediments.

The Tribune data were collected on the Tribune Branch Experiment Station Irrigation Field on Ulysses silt loam; a soil developed from windblown deposits. A brief description of the field plots is given in Table 1. Available water stored in the 5-foot soil profile exceeded nine inches at plant emergence at both locations.

Figure 1 presents the 30-year average rainfall pattern and the rainfall received during the warm season at both Manhattan and Tribune. Rainfall at Tribune was 8.3 inches compared to

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a 14.0 inch average. Rainfall at Manhattan was 18.4 inches compared to a 25.5 inch average.

Table 2 gives 1974 corn grain yields at Manhattan and Tribune. Treatments consisted of no in-season irrigation; one irrigation at either one week before tasseling, during silk emergence, or at blister stage; and three irrigations, one at each of the three growth stages mentioned. Corn plots at Tribune received a pre-plant irrigation.

Table 3 gives sorghum grain yields at Manhattan and Tribune. Treatments consisted of no

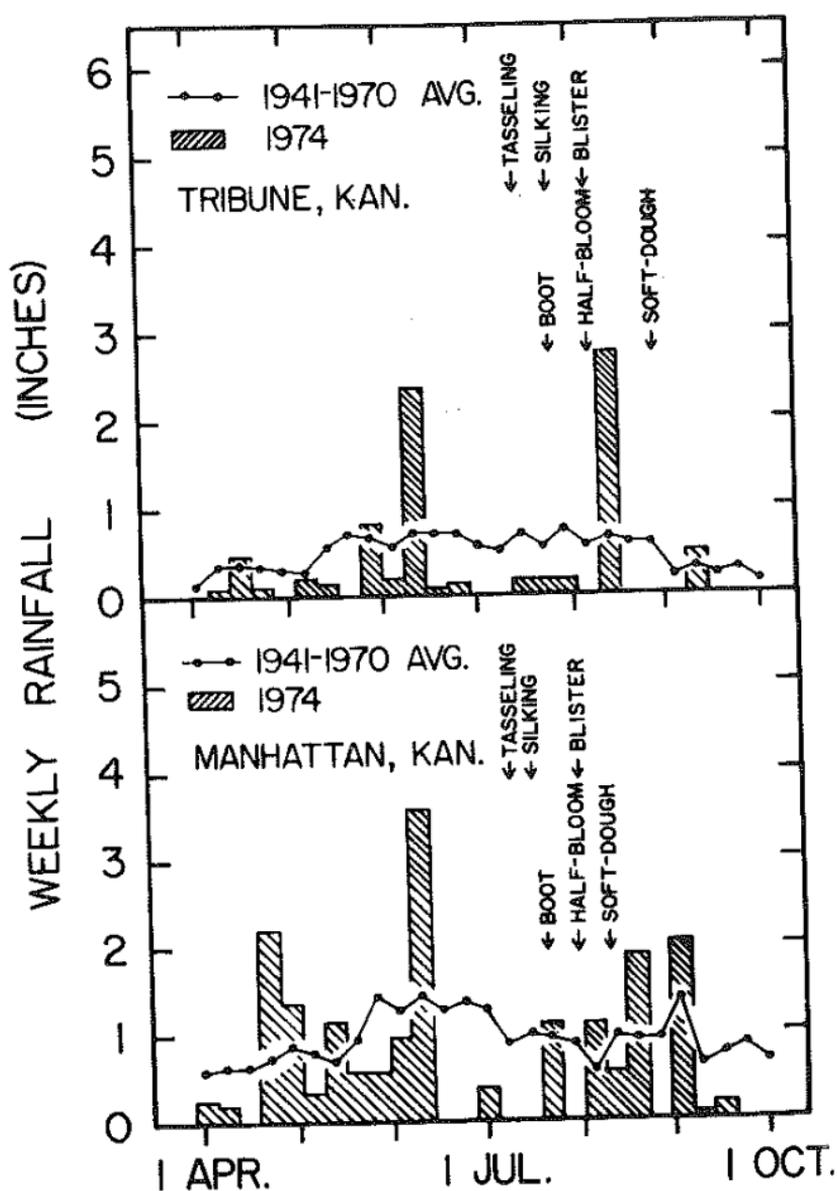


Figure 1.—Thirty-year rainfall pattern and rainfall received during 1974, Manhattan and Tribune, Kansas.

Table 1.—Information on corn and grain sorghum field plots, 1974.

	Corn		Grain Sorghum	
	Manhattan	Tribune	Manhattan	Tribune
Planting date	May 13	May 7	May 21	May 29
Variety	Prairie Valley 82S	Pioneer 3390	Pioneer 846	T-E 66B
Population (plants/acre)	25,500	23,000	88,500	70,000
Row width (inches)	30	30	30	30
Plot size, ft.	25 x 40	25 x 50	25 x 40	25 x 50
Fertilizer (per acre)	170 lbs N 36 lbs P ₂ O ₅	191 lbs N 46 lbs P ₂ O ₅	117 lbs N 36 lbs P ₂ O ₅	191 lbs N 46 lbs P ₂ O ₅
Inches of available water in 5-foot profile on date listed	(June 12) 12.8	(May 29) 9.1	(June 20) 13.8	(June 11) 9.5

Table 2.—Corn grain yields at Manhattan and Tribune, Kansas, as influenced by irrigation in 1974.

Time irrigated*	Water applied (in.)		Yield (bu/acre)**	
	Manhattan	Tribune	Manhattan	Tribune
One week before tasseling	4.0	6.0	106.3	110.7
During silk emergence	4.0	6.0	112.8	91.6
At blister stage	4.0	6.0	70.2	69.1
One week before tasseling, during silk emergence, and at blister stage	12.0	18.0	146.1	119.8
No in-season irrigation	0.0	0.0	45.9	78.5
LSD			28.3	24.2
0.05				

Table 3.—Sorghum grain yields at Manhattan and Tribune, Kansas, as influenced by irrigation in 1974.

Time irrigated*	Water applied (in.)		Yield (bu/acre)**	
	Manhattan	Tribune	Manhattan	Tribune
Boot stage	4.0	6.0	113.7	64.0
Half-bloom	4.0	6.0	106.6	58.1
Soft-dough	4.0	6.0	97.2	73.5
Boot stage, half-bloom; and soft-dough	12.0	18.0	108.8	78.4
No in-season irrigation	0.0	0.0	108.1	55.3
LSD			15.8	12.3
0.05				

* All plots at Tribune also received a pre-plant irrigation of 7.0 inches April 23, 1974.

** Yields are reported at 12.5% moisture content.

Note: All plots at Tribune were damaged by hail August 10 and by frost September 3.

in-season irrigation; a single irrigation at either boot stage, half-bloom; or soft-dough; and three irrigations, one at each of those growth stage. Grain sorghum plots at Tribune received a pre-plant irrigation.

The corn data indicate that a single irrigation applied near tasseling or at early silking increased yields greatly over one irrigation at blister stage or no in-season irrigation. Due to grain sorghum's drought resistance, and timely rainfall, no definite trend between irrigation timing and grain sorghum yield was determined in 1974. Limited in-season irrigation is most practical in soils that contain nothing to restrict extensive root development, that have large water-holding capacity, and if a moderate to large amount of available water is stored before planting.

Information in this report is for farmers, producers, colleagues, industry cooperators, and other interested persons. It is intended as an aid in irrigation management decisions and not as an irrigation guide. It is not a recommendation or endorsement and represents one year's research at two locations.

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