12-1983

Effect of Irrigation on Corn, Soybeans and Alfalfa Yields in Kentucky

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Soil Science News & Views

Vol. 4, No. 12 December 1983

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Irrigation is not widely used in Kentucky for two reasons: 1) high average yearly rainfall, and 2) lack of easily accessible and dependable water sources. However, even with the high yearly rainfall, droughts do occur during the growing season. According to past history, they are more likely to occur in West Kentucky than Central Kentucky and least likely to occur in East Kentucky.

Since corn has a high water requirement it is considered one of the more responsive crops. A 4-year experiment at Lexington from 1962 to 1965 resulted in 58 more bu/acre of corn when irrigated. More recent irrigation experiments at Lexington show increases that average a little less than 50 bu/acre. Recent experiments at Princeton show similar increases for irrigation (see table). The increases are significant by just adding water but they are more impressive if management is changed to take advantage of the improved growing conditions. Higher plant populations, increased nitrogen rate, and adapted varieties all add up to an increased advantage. The added yield for high management with irrigation was about 50 bu/ac more than the unirrigated corn during the more normal years of '80, '81, and '82. If a very dry '83 is included in the four-year average, the yield increase goes to 75 bu/ac. The 50 bu/ac yield increase would be sufficient to pay all costs and provide a nice return to labor and management for most irrigation systems.

The relative response of soybeans to irrigation is generally not as great as corn. The yield increases shown in the table for the 3 more normal years of '80, '81 and '82 averaged only about 6 bu/acre. This is a little less than 1/2 of what is needed to make it economical. If the extremely dry year is used in the average, the increase due to irrigation widens to 18 bu/ac. Farmer trials in Ky and Missouri generally show the yield increase due to irrigation to be in the 10 to 15 bu/ac range. There has been no research in Kentucky on the irrigation of double-cropped soybeans. They may be more responsive than full season soybeans since they sometimes need additional moisture for quick emergence and grow during a drier time of the year.

Information on the irrigation of alfalfa in Kentucky is not as extensive and there are few farmer experiences from which to gather information. Basically, it appears that the alfalfa plant is less susceptible to drought than corn or soybeans. Even in a severely dry year like 1983, the yield was only increased by 18% or 27% depending on the management and there was no increase in 1982. Additional years of data should help clarify the importance of irrigation on alfalfa.

SUMMARY The evidence indicates that one can expect good response from irrigating corn in Central and Western Kentucky. With management designed for irrigation, the yield increases are great enough to be economically profitable. Responses from irrigating soybeans are less dramatic and may be economically questionable in some cases. The small amount of data on alfalfa indicates it is quite tolerant to dry periods and responses are limited. One of the biggest limiting factors for irrigation in Kentucky is establishing or locating reliable and sufficient sources of water.

IRRIGATION YIELD COMPARISONS AT PRINCETON, KY.

		NORMAL MGT.			HIGH MGT.	
CROP	YEAR	NON-IRR.	IRR.	INCREASE	IRR.	INCREASE
CORN	1980	103	140	37	152	49
(bu/A)	1981	166	173	7	200	34
	1982	156	197	41	225	69
	1983	42	175	133	192	150
	Avg.	117	171	54	192	75
SOYBEANS[1/]	1980	31	43	12		
(bu/A)	1981	67	71	4		
	1982	60	63	3		
	1983	9	62	53		
	Avg.	42	60	18		
ALFALFA	1981	1.25	1.36	0.11	1.49	0.24
(T/A)	1982	9.76	9.51	-0.25	10.07	0.31
	1983	6.58	7.74	1.16	8.34	1.76
	Avg.	5.86	6.20	0.34	6.61	0.77

[1/] All yields from narrow rows.

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