YONTS, C. DEAN, University of Nebraska, Panhandle Research and Extension Center, 4502 Ave. I, Scottsbluff, Nebraska 69361. Late Season Irrigation Management for Sugarbeet.

ABSTRACT

Introduction:

Water for irrigation is a concern whether it is due to increased pumping costs, depletion of ground water, or competition for surface water resources. Irrigated agriculture production must become more efficient in the use of existing water supplies. If water is limiting, irrigation schedules to reduce the amount of water applied while at the same time minimizing the impact on crop yield are needed. The objective of this study was to improve the water use efficiency for sugarbeets grown under furrow and sprinkler irrigation systems. This study was designed to measure the effect of late season water stress on the production of sugarbeet.

Methods:

Two separate trials were conducted during 1995 and 1996. One field was furrow irrigated and the other field was irrigated using a center pivot sprinkler irrigation system. Irrigation treatments were replicated six times for the furrow trial and eight times for the sprinkler trial in a randomized complete block design. The irrigation treatments included: 1) Full irrigation through harvest, 2) No irrigation after mid August and 3) Limited irrigation after mid August. Field plots were a minimum of 50 feet long. Plots were 12 rows wide for the center pivot study and eight rows wide for the furrow study.

The variety Halt was selected for the sprinkler site and ACH184 for the furrow site. The furrow and sprinkler field plots were treated independent throughout the growing season. This included planting date, weed control, cultivation, irrigation schedule and harvest date. Within a year and irrigation system, cultural practices were the same prior to the mid-August time period when the irrigation treatments began. The field plots were planted to stand in 22 in. rows and irrigated to aid in germination and emergence.

Results:

During the 1995 growing season the sprinkler field plots were lost due to a severe rhizoctonia infestation. Tables 1, 3 and 5 give the irrigation schedules for the 1995 furrow trial and the 1996 furrow and sprinkler trials, respectively. The schedules include irrigations from the mid-August time period to the end of the growing season. Soil moisture levels were taken during the growing season using a neutron probe. These results are not presented here.

Tables 2, 4 and 6 give root yield, sugar content and total sugar production for the 1995 furrow trial and the 1996 furrow and sprinkler trials, respectively. Results indicate that sugar content, root yield and sugar production were not affected by reducing or stopping irrigation late in the growing season. Only during the 1995 furrow trial was there a trend for root and sugar yield to decline with no irrigation after mid-August. Within an individual year and irrigation trial there were no significant differences found for any of the yield parameters.

This study will be repeated during the 1997 growing season.

	Irrigation Treatment After Mid-August		
Irrigation date	Full	Limited	None
August 10	2.7	2.7	2.7
August 18	2.7	2.7	0.0
September 1	2.7	0.0	0.0
September 13	2.7	2.7	0.0
Total	10.8	8.1	2.7

Table 1. Late season irrigation schedule and application amounts (inches) for the full, limited and no irrigation treatments of the 1995 furrow irrigation trials.

Irrigation Treatment After Mid-August	Root Yield (tons/acre)	Sugar Content (percent)	Sugar Production (pounds/acre)
Full Irrigation	17.9	13.8	4900
Limited Irrigation	18.9	14.2	5300
No Irrigation	15.6	14.5	4500

Table 2. Root yield, sugar content and sugar production for the full, limited and no irrigation treatments of the 1995 furrow irrigation trials.

	Irrigation Treatment After Mid-August		
Irrigation Date	Full	Limited	None
August 6	2.7	2.7	2.7
August 16	2.7	0.0	2.7
August 27	2.7	2.7	0.0
September 10	2.7	0.0	0.0
Total	10.8	5.4	5.4

Table 3. Late season irrigation schedule and application amounts (inches) for the full, limited and no irrigation treatments of the 1996 furrow irrigation trials.

Irrigation Treatment After Mid-August	Root Yield (tons/acre)	Sugar Content (percent)	Sugar Production (pounds/acre)
Full Irrigation	24.8	16.4	8100
Limited Irrigation	25.5	16.5	8400
No Irrigation	25.2	16.8	8400

Table 4. Root yield, sugar content and sugar production for the full, limited and no irrigation treatments of the 1996 furrow irrigation trials.

	Irrigation Treatment after Mid-August		
Irrigation Date	Full	Limited	None
August 12	0.6	0.6	0.6
August 15	0.6	0.0	0.6
August 20	0.6	0.0	0.6
August 27	0.6	0.6	0.0
August 29	0.6	0.6	0.0
September 5	0.6	0.6	0.0
September 11	0.6	0.0	0.0
October 9	0.6	0.6	0.0
Total	4.8	3.0	1.8

Table 5. Late season irrigation schedule and application amounts (inches) for the full, limited and no irrigation treatments of the 1996 sprinkler irrigation trials.

Irrigation Treatment After Mid-August	Root Yield (tons/acre)	Sugar Content (percent)	Sugar Production (pounds/acre)
Full Irrigation	31.4	16.4	10300
Limited Irrigation	30.6	15.8	9700
No Irrigation	30.2	16.7	10000

Table 6. Root yield, sugar content and sugar production for the full, limited and no irrigation treatments of the 1996 sprinkler irrigation trials.