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13030 GLM Quarterly Progress Report

QUALITY AND QUANTITY OF RETURN FLOW AS INFLUENCED BY TRICKLE AND SURFACE IRRIGATION

July, August, and September 1974

PROJECT 13030 GLM

QUALITY AND QUANTITY OF RETURN FLOW AS INFLUENCED BY TRICKLE AND SURFACE IRRIGATION

Quarterly Report for the Period
July, August, September, 1974

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Progress Report

WRRI-308, Project 13030 GLM

July, August, September

1974

Progress during the last three months has been as planned. Accomplishments for the quarter are outlined below.

1. Growing and harvesting the 1974 cotton. Irrigation of the cotton grown on the surface and trickle irrigated plots was completed the last week of August.

Irrigation of the surface irrigated plots was again based on the Irrigation Scheduling Program of the Bureau of Reclamation. The climatological data for this program were collected at the weather station on the Plant Science Farm. This year temperature and humidity were monitored with a hygrothermograph. A portable fan-driven psychrometer was used for frequent calibration of the hygrothermograph in the field. A strip chart recorder was used to record the incoming radiation from the Eppley Pyrheliometer. Daily values of the incoming radiation were obtained by integrating the area under the curve on the chart from the strip chart recorder. Recently a digital integrator was obtained for the purpose of measuring the daily total radiation. The integrator was constructed for the project by the ARS laboratory at Boise, Idaho, according to an improved design of the Tanner-Thurtell integrator.

The total amounts of irrigation and rain water added to the surface plots after planting are presented in Table 1.

Table 1. Amount of irrigation and rainfall on surface plots during 1974 (inches), from planting till first harvest.

Treatment	Efficiency %	Depletion %	Water applied 4/19-9/24	Rain 4/19-9/24	Rain + irrigation 4/19-9/24	
1	80	25	25.9	8.0	33.9	
2	80	50	24.1	8.0	32.1	32.9
3	80	75	24.6	8.0	32.6	
4	90	25	24.1	8.0	32.1	
5	90	50	23.4	8.0	31.4	31.6
6	90	75	23.3	8.0	31.2	
7	100	25	23.2	8.0	31.2	
8	100	50	23.2	8.0	31.2	30.8
9	100	75	21.9	8.0	29.9	

The total amounts of irrigation applied to the trickle plots and the total rainfall during the 1974 growing season are presented in Table 2.

Table 2. Amounts of irrigation and rainfall on trickle plots during 1974 (inches), from planting till first harvest.

Treatment	Water applied 5/6/74 - 9/24/74	Rain	Rain and irrigation 5/6/74 - 9/24/74
0.2 atm	22.1	8.0	30.1
0.6 atm	18.6	8.0	26.6

The hydraulic gradients in the subsoil were also measured during the 1973 growing season, with tensiometers placed at two depths below the root zone of the cotton crop. Average gradients were calculated for each month and each treatment. As in 1973, no significant differences were found between the average hydraulic gradients of the treatments. Therefore the monthly gradients of

the treatments were averaged for all treatments. The results were:

July, 1974	- 0.61
July, 1974	- 0.78
August, 1974	- 0.90
September, 1974	- 0.76

At all times the hydraulic gradients were directed downward, indicating some downward movement of water. A reversal of gradients due to water uptake by roots was not observed. Due to the sharp interface between the clay loam and the underlying sand, cotton roots do not penetrate the sandy subsoil, and therefore no drying of the sand in the subsoil other than through gravity flow is expected. The sharp discontinuity in texture between the sand and the clay would also eliminate upward movement from the sand into the clay.

All plots were harvested once during the last two weeks of October 1974. The yields in pounds of lint and bales per acre are presented in Table 3. A correction factor of 0.35 was used to calculate lint cotton.

Work planned for the last quarter:

During the last quarter harvesting of cotton will be completed. Samples will also be taken from the soil within each plot at 20 cm depth increments to a depth of 160 cm. Saturation extracts will be prepared, and the electrical conductivity of the saturation extracts determined.

The data from the past three years of the experiment will be compared and analysed statistically. A final report covering all three years of the experiment will be written.

Table 3. Cotton yields from 1[c] harvest of trickle and surface irrigated plots (lint cotton).

Plot no.	lbs/acre	Bales/acre
1	788.5	1.58
2	852.5	1.71
3	766.4	1.53
5	796.6	1.59
6	829.9	1.66
7	787.0	1.57
8	792.1	1.58
9	692.7	1.39
10	863.7	1.73
11	692.2	1.38
12	716.9	1.43
13	546.5	1.09
14	775.4	1.55
15	762.3	1.52
16	698.8	1.40
17	689.7	1.38
18	758.3	1.52
20	904.0	1.81
21	765.3	1.53
22	679.1	1.36
23	672.6	1.35
24	665.0	1.33
25	810.2	1.62
26	637.3	1.27
27	763.8	1.53
29	725.0	1.45
30	864.7	1.73
Mean	751.7	1.50
St. Dev.	79.8	.16
T1	882.1	1.76
T2	887.9	1.78
T3	747.5	1.49
T4	888.7	1.78
T5	961.0	1.92
T6	840.8	1.68
Mean	868.0	1.74
St. Dev.	70.6	.14