

Irrigation and Drainage Letter

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TENSIOMETER PARTS AND CONSTRUCTION

A mimeograph describing how to construct a tensiometer and listing the parts needed has been prepared by Dr. Albert W. Marsh and Dr. Sterling J. Richards. Farm advisors interested in assembling tensiometers for test plot work, or advising farmers how to build these instruments should have copies of this publication. Once you have the parts, the construction of the tensiometers is quite simple. Copies of this paper can be obtained from Dr. Marsh, Extension Irrigation and Soils Specialist, Riverside.

BACK PRESSURE CONTROL VALVES FOR USE WITH FERTILIZER INJECTOR SYSTEMS

The injection of fertilizers into irrigation systems may be a potential source of pollution to waters used for human consumption. The back flow of water containing fertilizers into domestic water supply systems or into wells used for domestic purposes should be avoided. Approved back pressure preventers should be installed upstream from the point of injection of the fertilizers on such systems.

The Department of Water and Power, City of Los Angeles, has requested that a statement to this effect be included in every

publication which mentions devices for adding fertilizers to irrigation water.

CONFERENCE ON USE OF SPRINKLER IRRIGATION IN DESERT AREAS

A meeting conducted by the Yuma, Arizona, office of the U. S. Bureau of Reclamation was held on April 29 to discuss the feasibility of using sprinklers for irrigating arid desert areas. A tour was made to test farms on the Welton Mesa and Imperial East Mesa where sprinklers are being tried. Participating in the conference were representatives from government agencies, irrigation districts and the universities of Arizona and California.

No definite conclusions were reached by the participants. Some thought that sprinklers were the most feasible method of applying water to the sandy soils found in those areas. The report of the Imperial Irrigation District of their studies on the East Mesa showed that the income from alfalfa was not sufficient to pay the cost of sprinkler irrigation. If sprinklers are used, it will probably be necessary to grow higher income crops. With higher income crops it is possible to utilize the short irrigation runs needed to obtain high efficiency with surface irrigation.

IRRIGATION AND MANAGEMENT PRACTICES FOR CORN

Attached is a report by Dr. L. D. Doneen of his experimental work on the irrigation of corn. Results of irrigation trials in relation to date of planting, irrigation at various stages of plant development, timing of the last irrigation, and cultural and irrigation management are reported.

STAFF OF DEPARTMENT OF IRRIGATION AND
SOILS, UC LOS ANGELES

Attached is a listing of the Los Angeles staff and fields of work.

MEETINGS

June 22-25 - American Society of Agricultural Engineers, 51st Annual Meeting, UC Santa Barbara.

IRRIGATION AND MANAGEMENT PRACTICES FOR CORN

By L. D. Doneen

Irrigation research on corn has been conducted periodically over a number of years reflecting the spasmodic interest shown in this crop. The earlier work was with sweet corn and the recent investigations with field corn. The basic principles of irrigation seem to apply to both crops. These experimental crops were grown on Yolo clay loam at U. C. Davis.

In many of the previous irrigation trials, it was observed that frequently irrigated plots, where the soil moisture had been maintained at a relatively high level, produced the highest yields. In some trials the early irrigations, when the plant was small, appeared to contribute to high yields. In comparing yields for various years, it was observed that the drier plots planted early in the season had higher yields than late season plantings.

Irrigation at Various Stages of Corn Development

To test the importance of planting date, randomized plots were sown on April 11 and May 29. The plots at each planting date were divided into a series of treatments consisting of 4 plots. Each treatment received a single irrigation at various stages of plant development, except treatment "B" which received 6 applications. The experiment was designed to study the influence of irrigation at various stages of plant development. The results are given in table 1. The soil was wet to a depth of 10 feet at planting and the plots were unfertilized. It seemed reasonable--the drier plots could not efficiently utilize fertilizer placed in the dry surface soil, so to eliminate fertility as a variable no fertilizer was applied.

Table 1. Critical stage of plant development for irrigating corn

Treatment and Stage of Development	Irri- gation Dates	Plant Spacing No. inches	Ears per Plant	Lbs. per ear	% Shelled	Yield Tons/A
<u>Early planting - April 11</u>						
A-4 inches high, May 8--.25 in. rain	None	13.5	1.10	0.41	75	2.00
C-8 inches high	5/16 1	13.2	1.13	0.46	74	2.33
D-27 inches high	6/5 1	11.9	1.09	0.48	77	2.65
E-48 inches high, tassel in boot	6/19 1	13.6	1.17	0.47	76	2.47
F-72 inches high, 80% tasseled	7/3 1	12.7	1.16	0.48	77	2.64
G-Kernel in milk or soft dough	7/17 1	12.7	1.13	0.42	74	2.15
B	5/16-7/31 6	12.0	1.18	0.53	78	3.13
<u>Late planting - May 29</u>						
A	None	10.6	0.89	0.34	76	1.72
C-9 inches high	6/19 1	11.4	1.08	0.40	78	2.32
D-24 inches high	7/3 1	10.9	1.07	0.39	78	2.36
E-50 inches high, tassel in boot	7/17 1	10.6	0.96	0.39	77	2.15
F-75 inches high, 90% tasseled	7/31 1	10.3	0.95	0.34	77	1.89
G-Kernel in milk stage	8/14 1	10.9	0.96	0.36	75	1.84
B	6/19-8/28 6	10.8	1.12	0.44	77	2.83

Elimination of rain as a variable was desirable but not possible in 1957. From April 14 to 18 precipitation of 1.18 inches occurred, followed by drying wind and crusting of the soil surface. Consequently a poor stand was secured from the first planting April 11 as indicated in spacing of the plants from 12 to 13.5 inches, table 1. On May 8, when the corn was about 4 inches high it rained 0.25 inch. After the first irrigation on treatment "C" rain occurred through May 18 to 21 for a total of 1.08 inches; and again on May 23 for 0.37 inch. Therefore, in the surface soil relatively high moisture was maintained until the corn was about 20 inches high. In contrast the last planting, May 29, received no rain and is of most interest, because the crop was entirely grown under irrigation except for treatment "A".

The two early irrigation treatments "C" and "D", late planting, gave the highest yields of those receiving a single irrigation. Less response was obtained with the tassel in the boot, treatment "E". Irrigation after tasseling, treatments "F" and "G", gave only a slight increase in yield over the non-irrigated treatment "A". This trend is not evident in the early planting where the surface layer of soil was at a high moisture content from late spring rains. Under these conditions only the last irrigation, treatment "G", applied at the immature kernel development stage failed to give a response in yield.

Timing the Last Irrigation

When to apply the last irrigation to field corn has been a question posed by many growers. In 1956, the last irrigation was applied at 3 different stages of maturity; kernels in the milk, at the dough, and starting to dent. There were no differences in yield between these last irrigation dates. The experiment was repeated in 1957 with the last irrigation treatments applied over a longer plant development period. The results are given in table 2. The corn was planted on May 29, spaced to a foot per plant, and fertilized with 100 pounds per acre of nitrogen before the first irrigation. The plots were irrigated at approximately 2 week intervals until the last irrigation. The plot design was a latin square with 4 treatments and 4 replications. Only treatment "A", with the last irrigation applied at the time the tassels emerged from the boot, gave a reduction in yield.

Table 2. Time of applying the last irrigation

Treatment and Stage of Developments	Last Irri- gation	Ears per Plant	Lbs. per Ear	% Shelled	Yield tons/A.
A-80% tassels emerging from boot	7/19	1.19	0.48	78	3.08
C-Silking and fertilization of ear	8/2	1.39	0.51	79	3.21
D-Kernels in milk stage	8/16	1.17	0.52	79	3.21
B-Kernels in dough stage	8/30	1.22	0.54	78	3.21

Cultural and Irrigation Management

Three treatments were employed in this study: (A) the common method of irrigating in furrows between the 40 inch rows; (B) planting in the bottom of the furrows with the first irrigation in the same furrows, then listing the corn and placing the furrows between the rows; and (C) flooding the corn in strip checks. The corn was planted on May 29 and not fertilized. The plant spacing in the row was 12 inches. All treatments received 6 irrigations at approximately 2 week intervals. The first irrigation, light, was applied when the corn was 10 inches high. Between the first and second irrigation the furrows for treatment "B" were changed from down the row

to between the rows. The flood treatment "C" was irrigated as a strip check for the entire season. The results are given in table 3. Treatment "A" with the furrow between the rows gave the lowest yields by one ton. This same trend has been noted in other years, but usually with less difference.

Table 3. Cultural and irrigation management

Treatments	Ears	Lbs.	% Shelled	Yield tons/A
	per Plant	per Ear		
A-Furrow between rows	0.98	0.36	78	1.82
B-Planted in bottom of furrow	1.22	0.45	79	2.85
C-Planted on flat-flooding	1.15	0.45	80	2.93

Comments

Previous work on this same soil type indicates field corn approaching maturity has roots extending to a depth of 7 to 8 feet and available soil moisture equal to 9 to 10 inches of water. To produce 1 3/4 to 2 tons without irrigation is remarkable (62 to 71 bushels), table 1, as is the application of the last irrigation at the time of silking without reducing yield, table 2. These results are for a single season and should not be viewed as conclusive until supported by additional data.

April 1, 1958

MEET THE STAFF

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