Seepage Losses In Farm Ditches

Control Measures Depend on Cost And Amount of Water Being Lost

By Rex D. Rehnberg

For years farmers have known that some irrigation water is lost in conveying it from its source to the crop in the field. As long as water was plentiful and inexpensive, this conveyance loss was not a serious problem. As water became less abundant and more expensive, farmers began to think in terms of seepage-control measures.

Consider Cost

Since seepage-control measures involve some expense, each farmer has to weigh the cost of seepage control against the value of the water saved. Many approximate their seepage losses by observing the number of siphon tubes that can be run near the source of the water against the number that can be run at the opposite end of the ditch. Others observe the amount of time that it takes for water to cover a given area near the source and the time taken at some other point in the ditch. Although these are useful means of approximating the seepage losses, many other factors could cause the observed differences.

In order to establish a range within which seepage losses would fall, a series of seepage tests was conducted within the Salt River Valley and adjoining areas during 1950. Fields were selected on which the water was conveyed through a section of ditch at least one-fourth mile long before being distributed onto the field. The water entering and leaving this ditch section was measured with Sparling low-pressure line meters. The difference between the meter readings was expressed as a percentage of the inflow.

Seepage losses are commonly expressed as a percentage of inflow per mile of ditch. However, within the Salt River Project, few farmers will convey water through one mile of ditch. Within that area, water is delivered to the high point on each one-fourth section. There are only a few cases in which water is conveyed more than three-fourths mile before reaching the area to be irrigated.

Under these conditions it is more practical to express seepage losses on the basis of one-fourth mile ditch sections. The operator likewise will analyze each one-fourth mile section of ditch separately when considering the advisability of seepage-control measures.

Seepage Losses Vary

On the ten tests, the seepage loss per one-fourth mile varied from 2.7 percent to 16 percent of inflow (see Table below). Although tests of this nature on different soil types do not provide an accurate means of predicting water losses in a specific ditch, they do provide a range of seepage losses within which reasonable estimates can be made.

In the Table below, the tests have been arranged in order of decreasing seepage losses. Ditch 1 was selected because it has many characteristics which might be expected to result in a high water loss. A portion of the ditch passes through a sandy soil area. The ditch is wide and flat, resulting in a large average wetted perimeter (8.3 ft.).

Under these conditions it was not surprising to find a seepage loss of 16 percent of inflow. Valuing irrigation water at cost to the farmer (the most conservative method of valuation at the present time), about $850 worth of water normally flows through this section of the ditch. The annual cost of seepage in this one-fourth mile ditch section is, therefore, about $135.

Lining Is Effective

At the other extreme is ditch 10. The soil type, size of ditch and volume of water flowing through the ditch are very similar to ditch 1. However, the seepage has been reduced to 2.7 percent of inflow by the installation of a concrete lining. Since errors in Sparling meters may be up to 2 percent of flow, it is possible that this small indicated loss could have been due to the inaccuracies of the meters. The pattern of loss during the course of this test indicates that for all practical purposes on farmers' ditches, the amount of water lost through seepage in a properly installed concrete lining can be ignored.

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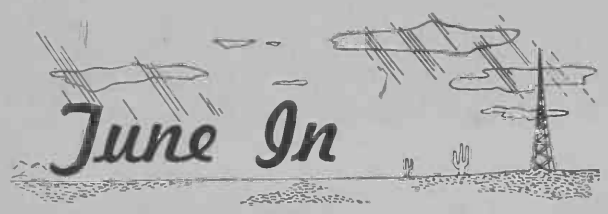
Seepage Losses in Farmers' Ditches in the Salt River Valley — 1950

Test No.	Soil Type	Average Wetted Perimeter	Average Inflow*	Seepage Loss Per ¼ Mile
		Feet	Cu. Ft./Sec.	Percent
1.	Mohave Fine Sand and Sandy Loam	8.3	5.4	16.0
2.	Cajon Silty Clay Loam	8.5	5.9	9.8
3.	Cajon Silty Clay Loam (Shallow Phase)	4.2	4.9	6.5
4.	Cajon Silty Clay Loam (Shallow Phase)	5.2	4.2	6.0
5.	Cajon Silt Loam and Silty Clay Loam	7.0	5.7	5.7
6.	Mohave Sandy Loam	4.6	4.4	3.6
7.	McClellan Loam	6.7	5.8	3.3
8.	McClellan Loam	6.4	7.5	3.0
9.	Cajon Silty Clay Loam and Fine Sandy Loam	8.0	11.9	3.0
10.	Mohave Fine Sand (Concrete Lined)	7.1	4.3	2.7

* To get Miners Inches multiply by 40; Gallons per minute, multiply by 449.



Daily (Except Sunday)

KRUX, Glendale, 6:55 a.m.—Farm Front—Maricopa County Extension Agent.

Sundays

KOY, Phoenix, 9:05 a.m.—Demonstration Garden (County Agent) Program.

Wednesdays

KYUM, Yuma, 6:45 a.m. — Yuma County Agricultural Extension Service Radio Program.

Fridays

KCKY, Coolidge - Casa Grande, 4:30 p.m.—Pinal County Farm and Home Program.

Saturdays

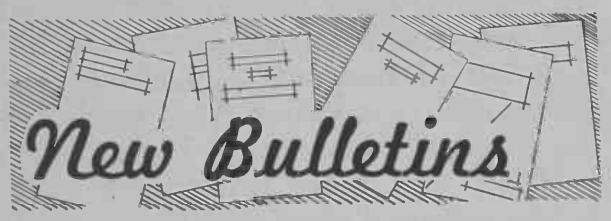
KGLU, Safford, 11:30 a.m.—Stepping Along with the Agricultural Extension Service.

Mondays, Wednesdays and Fridays

KGPH, Flagstaff, 12:45 p.m.—County Agent Program.

Second Monday of Each Month

KCLF, Clifton, 10:15 a.m. — The Homemakers' Program.



Here are new circulars and bulletins available without cost from your County Agricultural Agent's office:

Agricultural Extension Service

Color in Your Hands, Circular 178.

4-H Activities Make Your Club Work Sparkle, Circular 187.

Grasshopper Control on Arizona Ranges, Circular 188.

Control Grasshoppers on Crop Land, Circular 189.

Experiment Station

General Bulletins

No. 234—Cotton Fertilization.

No. 235—Cotton Cultivation with Tractors.

Technical Bulletins

No. 122—Absorption of Gypsum by Semi-Arid Soils.

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On four ditches, the seepage loss amounts to less than 4 percent of inflow per quarter mile. If the same volume of water were carried in these ditches as in number 1, the annual seepage loss per one-fourth mile would amount to less than $34, compared with the $135 in ditch number 1. The majority of the ditches in the Salt River Valley undoubtedly would fall between these two extremes.

Every farmer has to determine at just what point between these two extremes seepage-control measures become economically feasible. A systematic method of arriving at this point is included in a manuscript entitled "Management of Field Margins on Arizona Irrigated Farms," proposed for publication by the University of Arizona later this year.

—Rex D. Rehnberg is Assistant Agricultural Economist.

Performance Test Selects Beef Cattle

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At the present time two bulls that were so selected are in use in the purebred herd.

A breeding program, of the type described, is essentially a long-term proposition, as the procedures must be evaluated in terms of the progress evidenced by each succeeding livestock generation. However, data accumulated by various experiment stations over a period of years provide evidence to justify a long-range beef cattle breeding program.

—O. F. Pahnish is Assistant Animal Husbandman.

What About Those Neps?

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web and the yarn appearance. The following table shows that the number of neps in 100 square inches of card web increased from 6 for hand-ginned samples to 64 for commercially ginned samples where lint cleaners were used. The yarn appearance index decreased from 123 to 85. One hundred is average. (See table below.)

As long as the present cotton shortage exists, Arizona growers may be able to sell to fair advantage regardless of neps. However, this condition may change in the future, and we will again face keen competition with Delta cotton. If we are still throwing the maximum number of neps into our cotton when that time arrives, we will either not be able to sell at all, or will have to take the old discount again.

Irrigated cottons now have the advantage of greater yarn strength over most rain-grown varieties. If by breeding and careful harvesting and ginning, we can improve our position a little more from the standpoint of yarn appearance, we should be able to sell at a premium at all times.

—E. H. Pressley is Associate Plant Breeder; W. I. Thomas is Assistant Agronomist.

Results From Spinning Tests

	Type of Ginning				
	Experimental		Commercial		
	Hand	25-Saw Gin	No. 1 Without Lint Cleaner	No. 2 Without Lint Cleaner	No. 2 With Lint Cleaner
Nep count in 100 sq. in. card web	6	22	24	37	64
Yarn Appearance Index—100 is average	123	100	94	93	85