Irrigation

RESULTS OF SOIL MOISTURE TESTS IN IRRIGATION EXPERIMENTS

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Mr. President, Ladies and Gentlemen:

Last year while at our Palatka meeting, I promised to give you some of the results of our experiment, with soil tests in connection with furrow irrigation, and also showing the effects of cultivation in conservation of available moisture for the tree roots.

The charts shown are very general in character, as too much detail is not possible in a short paper, so the conclusions must be taken to apply to soil and crop conditions similar to those at, and near Orlando, where the soil is very light and sandy and the clay substrata is six or more feet beneath the surface.

(The charts are made to show graphically the path of the moisture after running in open furrows for 40 minutes, and for 15 minutes in the Walter Drennen Grove at Maitland, showing path of moisture both in percentages of soil moisture contained and the cross sections of the same. Another chart shows graphically percentage of moisture contained in the soil in cultivated and noncultivated groves also in cultivated and noncultivated open space, where the moisture can not be effected by tree roots).

The conclusions derived from the charts are very decided. It is plainly shown that the sandy soils of Florida will not permit running water for long lengths of time in open furrows as is the common practice among California irrigators. If the soils are as loose and porous as at Maitland, it is a good plan to run water in open furrows not over 20 minutes. It is seen that running water for 40 minutes results in considerable waste below the 6th foot, which probably means that the water has gone beyond the reach of any tree roots. In fact it is not likely that any appreciable amount of feeding roots from the orange tree reach below the 4th foot, while most of them are between the surface and the second foot. Capillary attraction will draw water upwards for several feet in some soils but this action seems to be very slight in the sandy Florida soils, especially when the soil gets very dry.

When water was run fifteen minutes in open ditches or furrows it is seen that there was no waste below the third foot; at any time, which would mean that the tree roots probably took up about all the moisture. The moisture curves for suc-
ceeding days show that it has disappeared with great rapidity. It was also noticed that the trees perked up within a few hours, which would tend to substantiate the theory that much of the moisture had been taken up through the tree roots. The comparison of the soil moisture in sections where no tree roots could reach, also shows a decided difference in the moisture content in favor of the treeless section.

The charts comparing cultivated and noncultivated groves were made from data collected from soil borings made in May of 1913 and 1914. The soil in the grove was very dry, so dry in fact that the sand would run from the hand like perfectly dry beach sand. The actual percentage of soil moisture contained in the open space shows that cultivation has conserved a great deal of moisture, especially within the top three feet. (The non-cultivated space being very dry to the 4th foot, while the fifth and sixth feet show some moisture.) The cultivated treeless space shows that the soil is in good condition all the way down, containing the moisture within the top three feet of soil. On the other hand the difference in the moisture content in the cultivated and noncultivated grove show very little difference, both being very dry. (The cultivated grove showed a little more moisture but both were dust dry.)

The conclusions to be drawn from the above would tend to show that cultivation conserved moisture. (Shown by comparison of noncultivated spaces). But that the tree roots take up this moisture very rapidly, and when the drouth is protracted all of the available moisture is taken up, so that continued cultivation would be of little or no use. Yet it must be seen that cultivation has done a lot of good as the trees have had the benefit of the moisture that otherwise would be lost by evaporation and grass and weed roots. So it seems apparent that cultivation will tide over a drouth of short duration, but that irrigation would be necessary to materially benefit the grove over a long drouth. It was shown last year that long drouths can be expected about one year in two, taking averages over a period of 25 years although several wet years may follow in succession.

The furrow tests are also conclusive. They show that if furrow irrigation is to be practiced, it is wise to have large heads of water, and get it over each tree row rapidly. Or if the grades are not fit for large heads of water, it would be a good plan to use portable pipe made from galvanized sheet iron. (Using nothing less than six-inch sizes, made of 24-gage iron in ten-foot lengths.)

The use of terra cotta pipe for mains and laterals has been taken up in detail for the last three meetings. The favorable rains of the last few years have not called for much grove irrigation but the dry years are coming and the man that is prepared is the man that is going to make the money. It has been shown this year that when everybody grows big crops, no one gets big prices. Let's wait and see what the man will get who has a good irrigation plant, when another batch of those dry years come around. Most of us know what many of the growers will get who can't irrigate.

In conclusion it should be understood that the reason for irrigation is to apply
water to the soil, and to apply enough you must have a pumping plant and distributing system of large enough capacity. I have gone into much detail on the use of terra cotta pipe. I want to emphasize its use again. First, it is cheap. Second, it never wears or rusts out. Third, don’t use it until you know how to lay it or you will burst the pipe. Our office is always willing to give engineering aid on the construction of any irrigation plant, so I won’t enter into detail here but will be glad to see any of you personally.