Irrigation and Drainage Letter

UNIVERSITY OF CALIFORNIA
Agricultural Extension Service

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STATEWIDE SOIL COMPACTION COMMITTEE

The annual meeting of this committee was held at Davis in June to review progress made on statewide project H-1673. Portions of the research on this project, which consists of 15 objectives, are conducted on all 4 of the major campuses. Reports from the several researchers working on the project were presented at the meeting. The following is a condensation of some of the points presented:

The major problem associated with compaction is low rate of water intake and penetration. Possibly the importance of compaction should be estimated in terms of increased cost of operation rather than reduced yields, since usually attempts are made to maintain yields by whatever steps are necessary. Two of the men, W. A. Williams and W. J. Flocker, stated their research showed improvement in infiltration rate from gramineous cover crops but not from legumes. More explicit measurements on the influence of subsoiling and chiseling on the intake of water are needed; some measurements have shown no increase beyond the first or second irrigation, and possibly a decrease later. Vertical mulching has shown favorable response in several trials, but more information is needed under various conditions. Oxygen content in soils dropped to critical levels only following heavy irrigations. Moisture content of the soil at the time of traffic had more effect on compaction than speed or drawbar load of the tractor. There is a moisture content for maximum compaction (roughly field capacity) above and below which a given load produces less compaction.

REPORTS FROM COUNTIES

San Bernardino County--Dick Puffer: - We have 52 tensiometers installed on 9 plots in the citrus areas of the county. An attempt was made to include all soil types found in the citrus areas and to set up each plot to study the particular water needs of that grove. In the majority of the plots, the data show that irrigation practices should be changed. In several cases where the irrigation interval is too long, instruments reach very high readings, and fruit growth measurements show that the growth either stops or slows down considerably until the next irrigation. Other plots show that in problem soils the effective depth of rooting is even more shallow than was suspected, and that a lighter application applied more often would probably be benficial in reducing root rot and maintaining fruit growth.

More information is needed. However, the usefulness of the tensiometer for evaluating an irrigation practice in a citrus grove has been demonstrated this summer.

One of the big problems in citrus in our area has been what we call "plugged plumbing." When a tree is stressed for the lack of water, gum flows in the water conducting channels and eventually

MEETINGS

October 9, 10. . . Soil & Water Section ASAE, Riverside
November 5, 6, 7 . Sprinkler Irrigation Training Conference, Santa Ana

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Marsh - Booher - Houston

solidifies in the small twigs and roots. In some cases this causes a twig dieback, and in others, it just partially plugs the channels. During our periods of hot, dry, and windy weather, leaves on the end of these twigs are not able to get the water they need, and a serious leaf drop has resulted in many cases. We consider irrigation one of the most important tools that a grower has to improve the growth of his citrus trees.

Imperial County--Herbert Schulbach:-With the cooperation of the specialists of the University of California and with the assistance of the Imperial Hay Growers Association and several interested growers, soil moisture tensiometers are being used to evaluate stand depletion problems with alfalfa in Imperial Valley. The plots will be observed for yield, root diseases, influx of water grass, etc. The purpose of the study is to increase the alfalfa yields, or at least to determine to what extent irrigation influences or limits alfalfa production.

Orange County--Dwight Baier:- This project is an attempt to obtain information on desirable soil moisture conditions for maximum production of fruit and control of disease in Valencia oranges.

The first step has been to attempt to evaluate farmer practice as it affects the moisture conditions in oranges. Use is being made of the available soil moisture measuring devices, including tensiometers, gypsum blocks, and soil sampling. Three soil types have been selected: 1. A fine-textured uniform soil; 2. A coarse-textured uniform soil; 3. A highly-stratified soil. Gypsum blocks were installed only on the fine-textured soil, with the thought in mind that this is the only area where the moisture will fall within their useful range. Tensiometers were installed on all three soil types. Great care was taken to install them where the roots were, with the exception of the stratified soil. There the tensiometers were installed in the topsoil which is a medium light-textured soil, in a silt lense which occurs just below the topsoil, and in the coarse-textured layer just underlying the silt lense.

Preliminary observations indicate several interesting moisture conditions. First of all, it appears that the grower practice is keeping the soil at a low suction level, particularly on the coarser-textured soils in the months of cooler temperatures. For example, tensiometers in the stratified soil show maximum suction values above .3 bar only one time before August 1. Most of the readings are below .2 bar. As may be expected, the readings in the coarse-textured layer below the silt lense remain quite low throughout the season. Suction values in the coarse uniform-textured soil have never risen above .2 bar, except for the shallow tensiometer at the lower end of the run. The suction values in the fine-textured soil have been higher than those in the other two soils. They have rarely gone off scale. On the other hand, they have remained at 0 suction (saturation) for periods as long as 20 days.

SPRINKLER IRRIGATION TRAINING CONFERENCE

As announced earlier, this conference will be held November 5, 6, and 7 at the South Coast Field Station near Santa Ana. Attached is a diagram showing how to reach the station from Santa Ana, a distance of about 10 miles. The Freeway to Central is faster than Irvine Boulevard, but either may be used.

The program is nearly complete and will be approximately as follows:

Wednesday Morning

9:00-12:00 - Conference Room

Various sprinklers--their places and use	Mr. A. Gray Rainbird Sprinkler Co.
Portable aluminum systems	A representative from Industry
Friction losses in pipelines	L. J. Booher
Outline of the field program	A. W. Marsh

Wednesday Afternoon

1:30-4:00 - Two or more field groups

Pressure drop in long lines	L. J. Booher, C. E. Houston
Small sprinkler performance	A. F. Pillsbury, J. A. Corry

4:00-5:00 - Four field groups

Setting up sprinkler systems for following day

Thursday Morning

8:30-9:00 - Start sprinklers; make initial measurements.

9:00-12:00 - Conference Room

Procedure for uniformity pattern measurements
J. A. Corry and C. E. Houston

Use and uniformity of turf and small orchard sprinklers
A. F. Pillsbury

Soil-water-plant relations as a factor in sprinkler irrigation
A. W. Marsh

Sprinkler irrigation systems for orchards--Clarence Livingston
Irrigation system designer and orchardist

Thursday Afternoon

1:30-5:00 - Four field work groups

Various measurements on sprinkler lines started in the morning

Computation of results

Friday Morning

8:30-11:30 - Conference Room

Special factors in the use of sprinklers
Symposium by R. L. Branson, A. S. Deal, T. M. Little, A. O. Paulus, R. G. Platt

Experiences of farm advisors with sprinklers for various crops
Round table discussion

Friday Afternoon

1:00-3:00 - Conference Room

Reports from field work groups

Summary

A final program and announcement will be sent later.

File 2.63 or 12.19

COPPER TUBING FOR TENSIOMETER CONSTRUCTION

There has been some confusion concerning proper size specifications for copper tubing and fittings needed to construct tensiometers. This is understandable, because the metal industry uses different specification systems.

"Round Seamless Copper Tubes," hard drawn, are identified by the outside diameter in inches, called O.D. They come in various wall thicknesses identified by gage number ranging from 16 to 22 for 1/2 inch tubes. Probably No. 18, having a wall thickness of .049 inch, would be the best choice for tensiometers, though No. 20, having a wall thickness of .035 inch, would also be satisfactory.

"Copper Water Tubes" are used for plumbing and are divided into type "K" and type "L". Type "K" is recommended for under ground service; type "L" for interior plumbing. For this reason, we think type "K" a good choice for tensiometers, though either can be used. Both types may be obtained soft in 60 foot coils, or hard in 20 foot lengths. Either can be used, but I prefer working with the hard. Probably because of its use in plumbing, this class is specified by nominal sizes. Thus, a 3/8 inch nominal will have a 1/2 inch actual O.D. When ordering this kind of tubing, use the nominal specification but place the actual O.D. size in parenthesis.

"Round Seamless Copper Refrigeration Tubing" is soft drawn and sold only in coils of 50 feet. It is specified by the actual O.D. size and comes in only one wall thickness (.032").

"Round Seamless Copper Pipe," hard drawn, comes in 20 foot lengths. Standard pipe size specifications are used, and the 1/4 inch pipe size has an O.D. of .540 inches, which would not fit into a standard copper tee. Therefore, this type could only be used for mercury manometer type tensiometers. Furthermore, the wall thickness is much greater than necessary (.082), and would probably cost more per foot than other types.

Copper tees are specified by nominal size and should be ordered as "3/8 inch wrought fitting, copper to copper to copper." Adapters which will fit directly into the tee without the necessity of an intervening section of copper tubing can be obtained by ordering "Brass wrought reducing female adapter, 3/8" solder fitting male end by 1/4" SPS female threads."

Diagram for reaching South Coast Field Station

