

SAN JOAQUIN VALLEY GRAPE DAY

UNIVERSITY OF CALIFORNIA
KEARNEY HORTICULTURAL FIELD STATION
9240 South Riverbend Avenue
Parlier, California 93648

Thursday, August 16, 1979

Sponsored by University of California Cooperative Extension, Parlier
Fred Jensen, Extension Viticulturist, Program Chairman

PROGRAM

8:30 - 9:00 a.m. - Registration. Organize into groups of equal size for discussions and demonstrations.

THE EFFECTS OF LONG-TERM HERBICIDE USAGE IN VINEYARDS

A. H. Lange, Extension Weed Scientist, Cooperative Extension, Parlier

DRIP IRRIGATION MANAGEMENT AND PROBLEMS IN VINES

F. K. Aljibury, Area Soils and Water Specialist, Cooperative Extension, Parlier

PREPLANT SOIL MODIFICATION FOR GRAPEVINES

D. W. Grimes, Water Scientist, Land, Air and Water Resources, Davis - Parlier

CHIP BUDDING OF MATURE GRAPEVINES AT HIGH LEVEL

C. J. Alley, Specialist, Viticulture and Enology, U.C. Davis

THE PROBLEMS OF CONTROLLING GRAPELEAF SKELETONIZER

D. L. Flaherty and W. W. Barnett, Farm Advisors, Cooperative Extention, Tulare County and Fresno County respectively

11:30 a.m. - Adjourn

PREPLANT SOIL MODIFICATION FOR GRAPEVINES

D. W. Grimes, Water Scientist, Parlier
P. L. Wiley, Staff Research Associate, Parlier

Large land areas, especially in tree and vine growing cultures on the east side of the San Joaquin Valley, are compact and offer considerable resistance to expanding roots and water penetration. This affects the plants ability to establish an extensive root system and changes many water and nutritional management practices. Often it is not possible to get sufficient water into the soil to meet plant transpiration needs at peak demand times. Our recent studies have identified root limiting penetrometer soil strength values for diagnostic and predictive purposes. This study is intended to identify practical soil modification treatments that may benefit root extension. This in turn would alleviate water deficits associated with restricted root extension by allowing greater root proliferation in an increased soil volume for improved water and nutrient utilization.

A study was started in the spring of 1975 at the Kearney Field Station on a "mixed" soil area. About 50 percent of the study area is classed as Exeter sandy loam, 30 percent Hanford sandy loam, and 20 percent Hanford fine sandy loam. All of the area has a defined "tillage pan" at a depth of 8- to 16-in. and is underlain by a hard (San Joaquin hardpan) substratum at depths varying from 18- to 60-in. Five treatments were imposed directly in the designated vine row (before establishment) to evaluate varying soil disruption treatments. The treatments were:

T-1 - Control or no disruption.

T-2 - Single chisel shank to a depth of 20 in.

T-3 - Trench a cross sectional dimension of 6 in. (wide) by 30 in. (deep).

T-4 - Trench a soil volume 20 in. wide to a depth of 24 in.

T-5 - Trench a volume 20 in. wide to a depth of 48 in.

Trenched areas were immediately back-filled and vines established directly over the treated areas. Vines were trained in 1976 and penetrometer soil strength determinations made in the field in 1976 and 1978. Yield data have been collected from all nine replications (of the randomized complete block) for 1977 and 1978.

The table of soil strength values and production trends indicates a complex effect of treatments. Only T-5 shows a slightly higher yield than

the control (T-1) treatment. All other treatments give lower yields for the two harvest years. All soil modification treatments show reduced strength in the tillage pan zone but not below the pan zone of maximum strength. The most severe disruption treatment (T-5) has greater strength below 18 in. than the control treatment. This indicates that disrupting the native or genetic soil structure below the compact tillage pan allows reconsolidation back to a more compact state than the original condition. However, T-5 has production equal to or greater than the control treatment. This trend could result if the effect of T-5 is beneficial when the San Joaquin hardpan is disrupted in an area closer to the soil surface. A contour map of depth to the hardpan has been developed and will form the basis for differential harvest areas over length of plots in 1979 to test this hypothesis.

Table. Penetrometer soil strength and yields from the mechanical disruption of varying volumes of high strength soil.

Soil depth	T-1	T-2	T-3	T-4	T-5
(in.)		penetrometer soil strength, bars*			
0-6	1.63a†	1.83a	1.24a	1.02a	1.96a
6-12	16.73 b	12.32ab	9.49a	11.49a	11.51a
12-18	26.32 c	15.72a	16.68ab	17.05ab	20.92 b
18-24	19.83 bc	17.43abc	14.55a	14.90ab	21.53 c
24-36	13.63a	12.25a	13.58a	11.74a	18.14 b
		1978 yields, tons per acre			
	11.81 b	10.92a	10.84a	10.78a	11.85 b
		average of 1977-78 yields, tons per acre			
	9.51 bc	9.11 bc	8.30a	8.79ab	9.65 c

* Penetrometer soil strength was measured directly in the center of the row treatment zone in February, 1978.

† Numbers not followed by the same letter for values in the same depth increment or year differ at a 0.05 probability level according to Duncan's multiple range test.

CHIP BUDDING OF MATURE THOMPSON SEEDLESS VINES AT HIGH LEVEL

C. J. Alley
Department of Enology and Viticulture, U.C. Davis

T-budding has been a new method used for the past several years to change over varieties in a mature vineyard. The method requires the least skill and has given successful takes of above 90%. The earliest that T-budding can begin in the spring is when the bark slips which is generally the end of April. T-budding is generally done in May, June and through the middle of July in the San Joaquin Valley. The later in the summer the budding is done the smaller the resulting new head by the end of the growing season.

A method is needed to start budding earlier in the spring in order to get a larger new head established by the end of the growing season. Early work with chip budding indicated this as a possibility and the take for 1977 was as successful as T-budding (the control). This experiment was started February 1st to determine how early a grower might chip bud in the spring and obtain as successful a take as the control. Work at Davis in 1977 indicated that March chip budding gave a new head about 75% the size of the original head.

This work was to start budding earlier to determine the take that would be obtained. Vines were chip budded February 1, 15, March 7, 29, and May 4. Also on May 4 vines were T-budded to serve as controls.

Results indicate that the March and May chip budding were as good as or better than the controls. The February chip budding was poorer than the controls.

Vines of different budding dates are indicated by the color of surveyor's tape tied to the vine trunk as follows:

Date		Tape Color
Feb. 1		Orange
Feb. 15		Red
Mar. 7		Blue
Mar. 29		White
May 4		Green
May 4	T-bud (control)	Pink
	Rebudded vine	No tape

THE WESTERN GRAPE LEAF SKELETONIZER

D. L. Flaherty, Farm Advisor, Tulare County
W. W. Barnett, Farm Advisor, Fresno County

The western grape leaf skeletonizer has become a serious pest of grapes in the San Joaquin Valley. It has the potential of defoliating vineyards if not properly controlled. Young caterpillars cause damage by lining up side by side and then eating the lower surface of leaves, leaving the upper surface intact like a window. As the caterpillars grow older they disperse over the vine and finally eat the entire leaf except for the large veins.

The moth and caterpillar of the skeletonizer are easily identified. The moth has a metallic bluish-black color with long, narrow wings. It is a daytime flier. The caterpillar when fully developed is brilliantly colored. The body is yellow with two prominent, purplish transverse bands and several narrow black ones. To pupate, the caterpillars crawl under the bark on the trunk and spin a cocoon. Upon emerging from the cocoon, the adult moths mate and the female lays a large number of yellow eggs in a group on the underside of the leaves. Recent studies indicate three egg laying periods or generations (late April to late May; early to mid-July; and late August to mid-September) of GLS occur in the San Joaquin Valley.

Control

Unfortunately, at present there is no effective biological control of the grape leaf skeletonizer in the San Joaquin Valley. Parasites are currently being released with the hope that biological control of GLS can be accomplished. Until then, insecticides will be necessary to control the skeletonizer.

Thorough application of insecticides is important, making sure that the under surfaces of leaves are covered with residue. Studies and experience have shown that Kryocide®, an inorganic fluoride compound which acts as a stomach poison, is highly effective against GLS if properly applied. Moreover, secondary problems such as spider mites do not occur following the use of Kryocide® as commonly occurs with other pesticides. Currently, Kryocide® may be applied twice on wine and raisin grapes, the last treatment 30 days before harvest, and once on table grapes through the bloom period. Bloom treatments for omnivorous leafroller will also effectively control GLS. Other effective chemicals are carbaryl (Sevin®), Methomyl

(Lannate® or Nudrin®), and B.T. preparations (Dipel®, Biotrol®, and Thuricide®). B.T. is also selective but may require repeat applications since its residue is short lived. Carbaryl and Methomyl may cause spider mite problems in certain vineyard areas of the Valley.

THOMPSON GRAPE IRRIGATION

1979

LOCATION: Field 63, KHFS

OBJECTIVES: Determine water use on Thompson Seedless grapes and comparison of drip and furrow irrigation.

COOPERATORS: F. Aljibury
F. Jensen
A. Lange
P. Christensen

IRRIGATION OF VINEYARDS WITH EVAPOTRANSPIRATION (ET) CRITERIA*

F. K. Aljibury
Area Soils and Water Specialist

The term "evapotranspiration, ET" includes the sum of evaporation of water from the soil surface (E) and the water that evaporates from plant leaves, a process that is called transpiration (T).

There are three basic factors that affect ET:

1. Climatic Factors -

These include solar radiation, day length, wind, humidity, temperature and precipitation. Although there are these and other factors, by far the greatest influence on ET during the peak consumptive use period is attributed to the effects due to solar radiation. Solar radiation is the primary source of energy and has the greatest effect on ET. The incoming solar radiation is utilized for photosynthesis as well as for heating the air, the soil, the water and the plants. Variations in solar radiation slow or speed the rate of ET. At a given location ET rate may differ depending upon whether the field in question is surrounded by irrigated land or dry land. Adjacent fields of irrigated land depress the ET demand while the greater advective energy from the adjacent fields of dry land increase the ET of an irrigated field above the normal ET values.

2. Plant Factors -

These include things such as the percent of ground surface covered by plants, stage of plant growth, plant physiological transpiration behavior and the crop surface roughness.

Possibly the most important crop factor which affects the ET rate is the surface area of the plants intercepting radiation from the sunlight in relation to the soil area it covers. There is considerable variation in the groundcover condition from crop to crop. Some crops have approximately the same groundcover percentage throughout the year. For example, mature plants such as citrus and olives provide a nearly constant cover throughout the

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* Presented at U. C. Grape Day, August 16, 1979

year. In contrast, mature vines provide a constant cover only after they are completely leafed out and have little ET demand in the winter months when the plants are small and shade a portion of the ground, the vines will intercept a small proportionate segment of the energy available for ET and therefore it is smaller than that for mature vines. Estimates of ET for young vines is another challenge for research to determine. The presence of a full cover crop however should be considered as full ET even if the vineyard canopy covers only a small portion of the ground surface.

The angle of the sun in relation to the earth's surface and orientation of the crop rows may render the effective groundcover to be 100 percent, long before the crop completely covers the ground. The California Department of Water Resources reported in 1967 that the direct and advective energy in cotton produced maximum evapotranspiration rates when the actual groundcover was around 50%. In general, above 70% is considered full cover.

Young and rapidly growing plants have higher rates of ET and longer period per day of stomata opening than mature plants under otherwise equal conditions. To estimate the ET requirement of a young vineyard is difficult due to the lack of experimental information. However the few experiments conducted show that the relationship between ET and per cent cover is not linear. Thus the ET requirement of a young vineyard with 40 per cent cover is not 40% of the ET of a mature vine, it is substantially higher. The reason for that is attributed to the interception of the radiant energy by the bare ground around the young vines which heat the soil and cause higher transpiration demand on the vine foliage exceeding that of mature vines on a percent cover basis.

The physical and the physiological conditions of the transpiring plant plays an important role in the amounts of water lost to the atmosphere. For example, the leaves of some plants incur smaller water losses than others because they have waxy leaves, sunken stomata or hairy surfaces which reduce the energy impact on the leaf surface.

Evapotranspiration is furthered by the turbulent mixing of the air above the crop. Other things being equal the air above a pasture is much smoother than the air above a vineyard. The air mixing process

hastens the water vapor transfer away and speeds the flow of renewal air over the evaporative surface.

3. Soil Factors -

The soil factors primarily involve soil moisture (the degree of wetness) and the moisture transmissibility from the soil to the plant roots.

The rate and extent of moisture movement from the deeper soil to the soil surface affects the evaporation losses. Moisture moves to the surface from a deeper depth more readily for a clay soil than for a sandy soil and, therefore, the surface evaporation from finer texture soils extends for a longer time than from sandy soils.

The slow rate of water penetration for a clay soil also causes the soil surface to remain moist for a longer period of time; thus the surface evaporation would be greater than for lighter soils having a higher infiltration rate.

Estimates of ET

There are several ways of estimating ET:

a) Evapotranspiration of plants measured directly where plants are grown in the field. A lysimeter (similar to a sunken tub) is suspended on a scale so all the water received is weighed and all water lost to ET is measured and recorded. The ET of pasture, alfalfa, corn, wheat, tomatoes and others have been determined this way.

b) Measurements of the soil moisture depletion by the crop during periods between irrigations through soil sampling, tensiometers and the neutron probe.

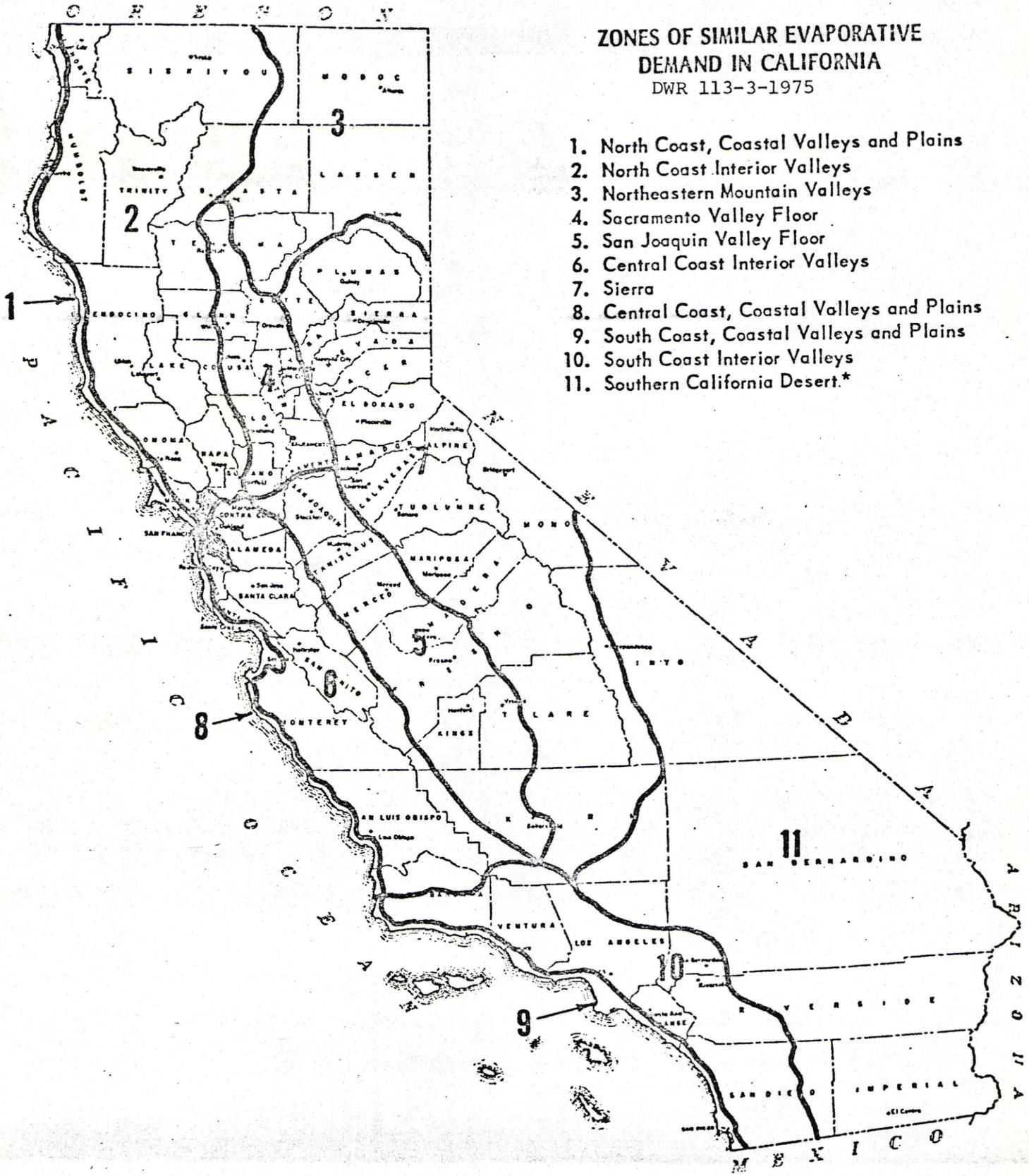
c) Empirical equations using climatic data and various factors which affect ET, such as sunlight, temperature, wind and others. These measurements are then fitted into empirical equations to estimate the ET of the crops. Among the more popular formulas are the Blaney-Criddle, Jensen-Haise, and Penman's equation.

d) Correlation of ET with measured evaporation from shallow pans containing water and maintained under a set of standard condition. Many studies conducted in California have shown a good correlation between U. S. Weather Bureau Class A Pan (10 inches deep, placed in pasture) and the evapotranspiration of different crops. For this

purpose the State of California was divided into eleven climatic zones shown in Figure 1 while Table 1 shows class A pan evaporation at various areas of the state. Factors (coefficients have been developed for various crops and conditions. This experiment which was initiated three years ago was designed to develop the crop coefficient for Thompson Seedless Grape and the procedure to use in calculating the percent cover of the vine.

e) Determination of the ET of crops at different stages of growth by using a factor applied to the "potential evapotranspiration": (PET). The PET is the evapotranspiration rate of a large, well watered alfalfa field or pasture at full groundcover. The California Department of Water Resources summarized PET in Table 2. Each crop would need a different factor (coefficient) to determine its ET as shown in the estimate presented in Table 3 for some crops in the Central Valley. This experiment is also hoped to develop the coefficient needed for Thompson Seedless Grapes.

FIGURE I



ZONES OF SIMILAR EVAPORATIVE DEMAND IN CALIFORNIA

DWR 113-3-1975

1. North Coast, Coastal Valleys and Plains
2. North Coast Interior Valleys
3. Northeastern Mountain Valleys
4. Sacramento Valley Floor
5. San Joaquin Valley Floor
6. Central Coast Interior Valleys
7. Sierra
8. Central Coast, Coastal Valleys and Plains
9. South Coast, Coastal Valleys and Plains
10. South Coast Interior Valleys
11. Southern California Desert.*

*Reliable Data on evaporative demand is generally unavailable in the Southern California Desert. Studies by other agencies are in progress in Imperial Valley and Palo Verde Valley (Zone 11)

Table1. SUMMARY OF AVERAGE PAN EVAPORATION IN CALIFORNIA[1/]
In inches DWR 113-3, 1975

MONTH / ZONE	Northeastern - Mountain Valleys 3	North Coast - Coastal Valleys and Plains 1	North Coast - Interior Valleys 2	Sacramento Valley 4	San Joaquin Valley 5	Central Coast - Coastal Valleys and Plains 8	Central Coast Interior Valleys 6	South Coast - Coastal Valleys and Plains[2/] 9	South Coast - Interior Valleys[2/] 10
Jan	0.8	0.7	1.2	1.5	1.3	2.5	2.3	2.5	2.4
Feb	1.3	1.3	1.6	2.4	2.3	2.9	2.9	3.3	3.2
Mar	2.8	2.6	3.1	3.9	4.2	4.1	4.3	4.1	4.4
Apr	4.8	3.2	4.4	5.7	5.9	5.1	5.6	4.9	5.5
May	6.4	4.2	6.4	7.5	8.3	6.0	7.3	5.8	6.5
Jun	7.5	4.6	7.6	9.3	9.6	6.3	7.9	6.6	7.7
Jul	10.1	4.5	9.1	10.1	10.0	6.8	8.6	7.0	8.8
Aug	9.0	4.3	8.0	8.6	8.5	6.1	7.7	7.0	8.6
Sep	6.3	3.6	6.0	6.8	6.3	5.0	6.2	5.8	6.8
Oct	3.8	2.3	3.6	4.6	4.4	4.3	5.0	4.6	5.1
Nov	1.3	1.5	1.6	2.2	2.1	3.0	3.1	3.6	3.2
Dec	0.7	1.0	1.0	1.4	1.0	2.1	2.1	3.1	2.6
M - O[3/]	50.7	29.3	48.2	56.5	57.2	43.7	52.6	45.8	53.4
J - D[4/]	54.8	33.8	53.6	64.0	63.9	54.2	63.0	58.3	64.8

1/ Evaporation from USWB - Class "A" pans located in irrigated pasture (or comparable) environment.

2/ No evaporation data (irrigated pasture environment) available. Monthly evaporation rates listed are subjective estimates based upon dry land pan evaporation and other climatological data.

3/ March through October (principal growing season)

4/ January through December

Table 2 SUMMARY OF ESTIMATED POTENTIAL EVAPOTRANSPIRATION IN CALIFORNIA 1/ 2/ DWR 113-3, 1975
In inches

MONTH / ZONE	Northeastern Mountain Valleys 3	North Coast - Coastal Valleys and Plains 1	North Coast - Interior Valleys 2	Sacramento Valley 4	San Joaquin Valley 5	Central Coast - Coastal Valleys and Plains 8	Central Coast - Interior Valleys 6	South Coast - Coastal Valleys and Plains 3/ 9	South Coast - Interior Valleys 3/ 10	Southern California Desert 4/ 11
Jan	0.6	0.5	0.8	1.1	0.9	1.8	1.6	1.8	1.7	2.7
Feb	1.0	1.0	1.2	1.8	1.7	2.1	2.1	2.4	2.4	3.6
Mar	2.1	2.0	2.4	3.0	3.2	3.1	3.3	3.1	3.3	5.9
Apr	3.7	2.5	3.4	4.4	4.5	3.9	4.3	3.8	4.2	7.6
May	5.0	3.3	5.0	5.8	6.5	4.7	5.7	4.5	5.1	10.1
Jun	5.8	3.6	5.9	7.3	7.5	4.9	6.2	5.1	6.0	11.4
Jul	7.9	3.5	7.1	7.9	7.8	5.3	6.7	5.5	6.9	11.6
Aug	7.0	3.4	6.2	6.7	6.6	4.8	6.0	5.5	6.7	9.6
Sep	4.9	2.8	4.6	5.2	4.8	3.8	4.8	4.5	5.2	8.5
Oct	2.8	1.7	2.7	3.4	3.3	3.2	3.8	3.4	3.8	6.3
Nov	0.9	1.1	1.2	1.6	1.5	2.2	2.3	2.6	2.3	3.5
Dec	0.5	0.7	0.7	1.0	0.7	1.5	1.5	2.2	1.8	2.0
M - O 5/	39.2	22.8	37.3	43.7	44.3	33.7	40.8	35.4	41.2	71.0
J - D 6/	42.2	26.1	41.2	49.2	49.0	41.3	48.3	44.4	49.4	82.8

1/ Potential ET = ET of grass.
2/ Calculated from statewide average ET/Ep coefficient and area average Ep, except as noted.
3/ No evaporation data (irrigated pasture environment) available. PET estimates based upon estimated evaporation.
4/ An estimate of ET - grass for Imperial Valley. Calculated by W. O. Pruitt, U.C. Davis, from ET by alfalfa (excluding 2 weeks following cutting) as observed by Robert D. LeMert, USDA-ARS, Brawley. (A 10-15% lower ET by grass than by alfalfa was assumed.)
5/ March through October (principal growing season).
6/ January through December.

Table 3

TENTATIVE RECOMMENDED MONTHLY EVAPOTRANSPIRATION COEFFICIENTS FOR SOME PRINCIPAL CENTRAL VALLEY CROPS[1] DWR 113-3, 1975

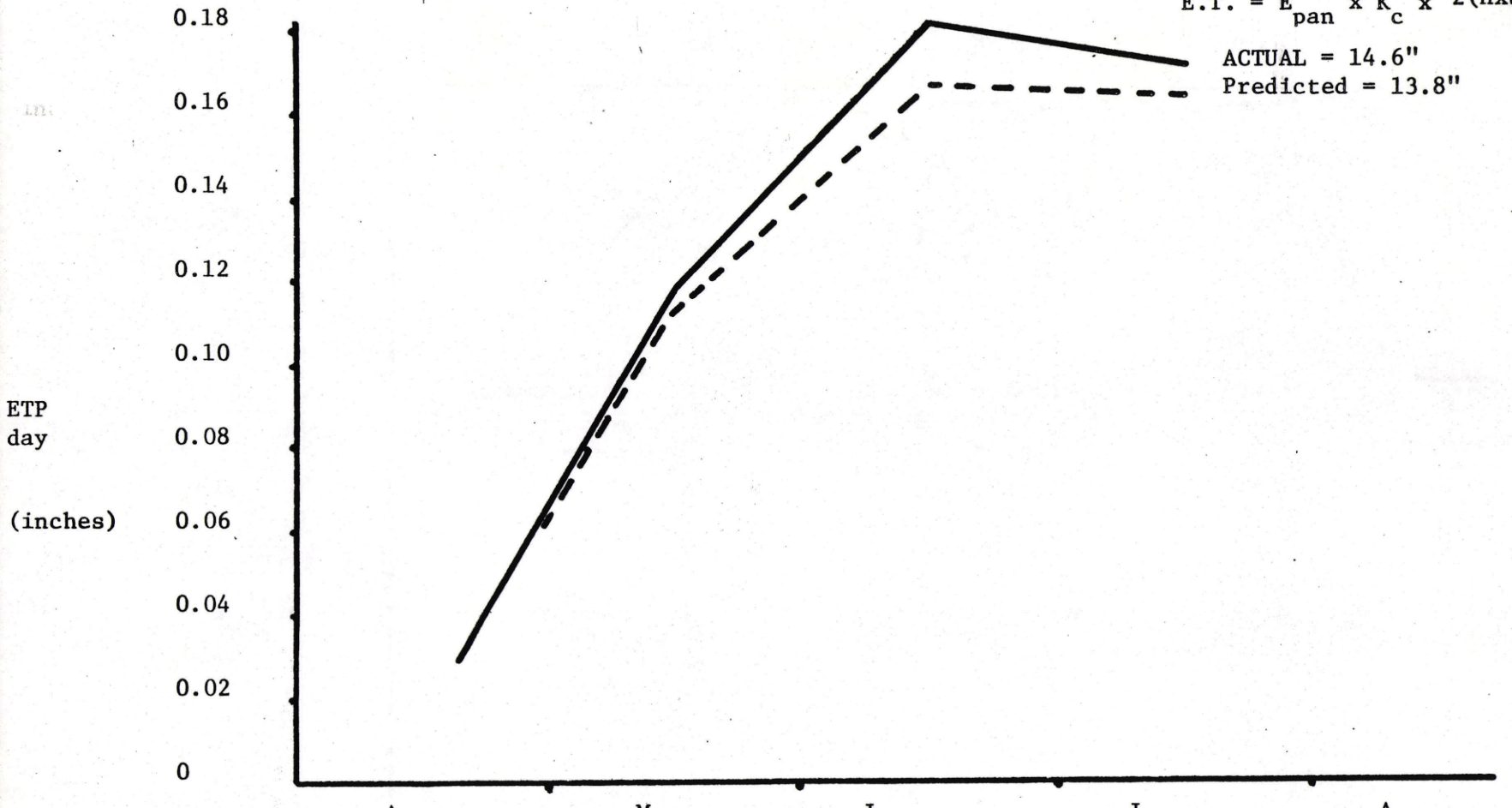
	Pan Evapotranspiration Coefficients (ET/Ep)							
			Sugar Beets		Cotton		Deciduous	Rice
	Improved Pasture	Alfalfa (Hay)	S.V. [2]	S.J.V. [2]	Solid & 2x1 [3]	2x2 [3]	Orchard	S.V.[2]
J	0.69	0.69	0.64	-	-	-	-	(0.57)[6]
F	0.70	0.70	0.48	-	-	-	-	(0.60)
M	0.75	0.70	-	0.40	-	-	0.50[4]	(0.35)
A	0.78	0.70	-	0.60	-	-	0.55	0.80
M	0.80	0.71	0.23	0.74	0.13	0.80	0.65	1.00
J	0.81	0.73	0.62	0.80	0.63	0.37	0.70	1.00
J	0.82	0.76	0.85	0.85	0.97	0.87	0.75	1.00
A	0.83	0.80	0.86	0.60	1.00	0.92	0.75	1.00
S	0.81	0.80	0.88	0.30	0.86	0.83	0.70	1.00
O	0.78	0.77	0.77	-	0.46	0.40	0.60	0.70
N	0.74	0.74	0.74	-	-	-	-	(0.63)
D	0.70	0.70	0.65	-	-	-	-	(0.58)

1/With judgment may be used for Central Coast, Central Coastal Valleys, and Northeastern Mountain Valleys
2/S.V. - Sacramento Valley; S.J.V. - San Joaquin Valley
3/Skiprow Cotton
4/In the San Joaquin Valley, use 0.40 as coefficient
5/In the San Joaquin Valley, use 0.0052 as coefficient
6/Values in ( ) are for nongrowing season. Values may change with differences in rainfall.

1979 THOMPSON GRAPES

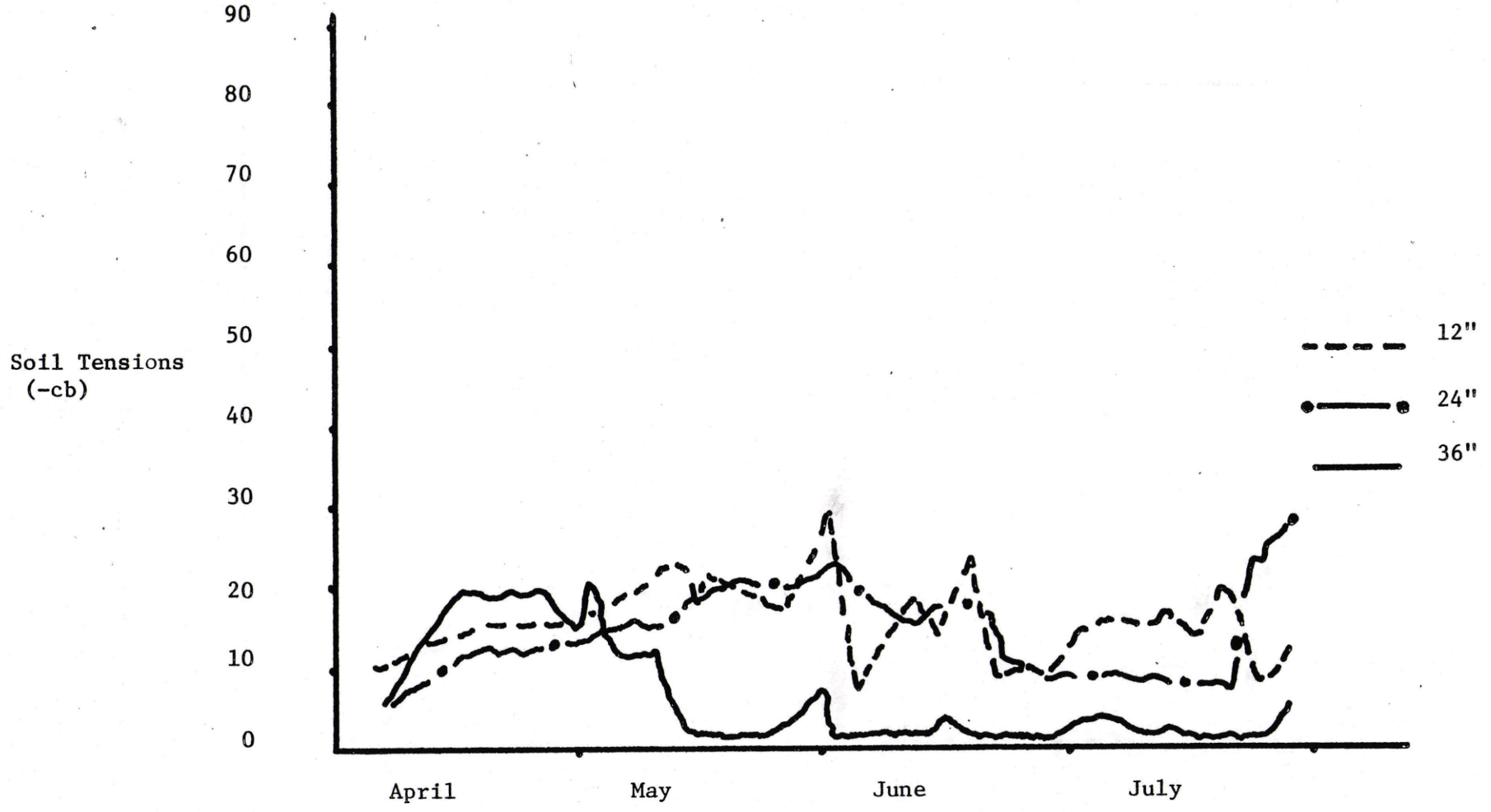
$$E.T. = E_{pan} \times K_c \times \frac{2(HxW)}{2(HxW)_{max.}}$$

ACTUAL = 14.6"
Predicted = 13.8"

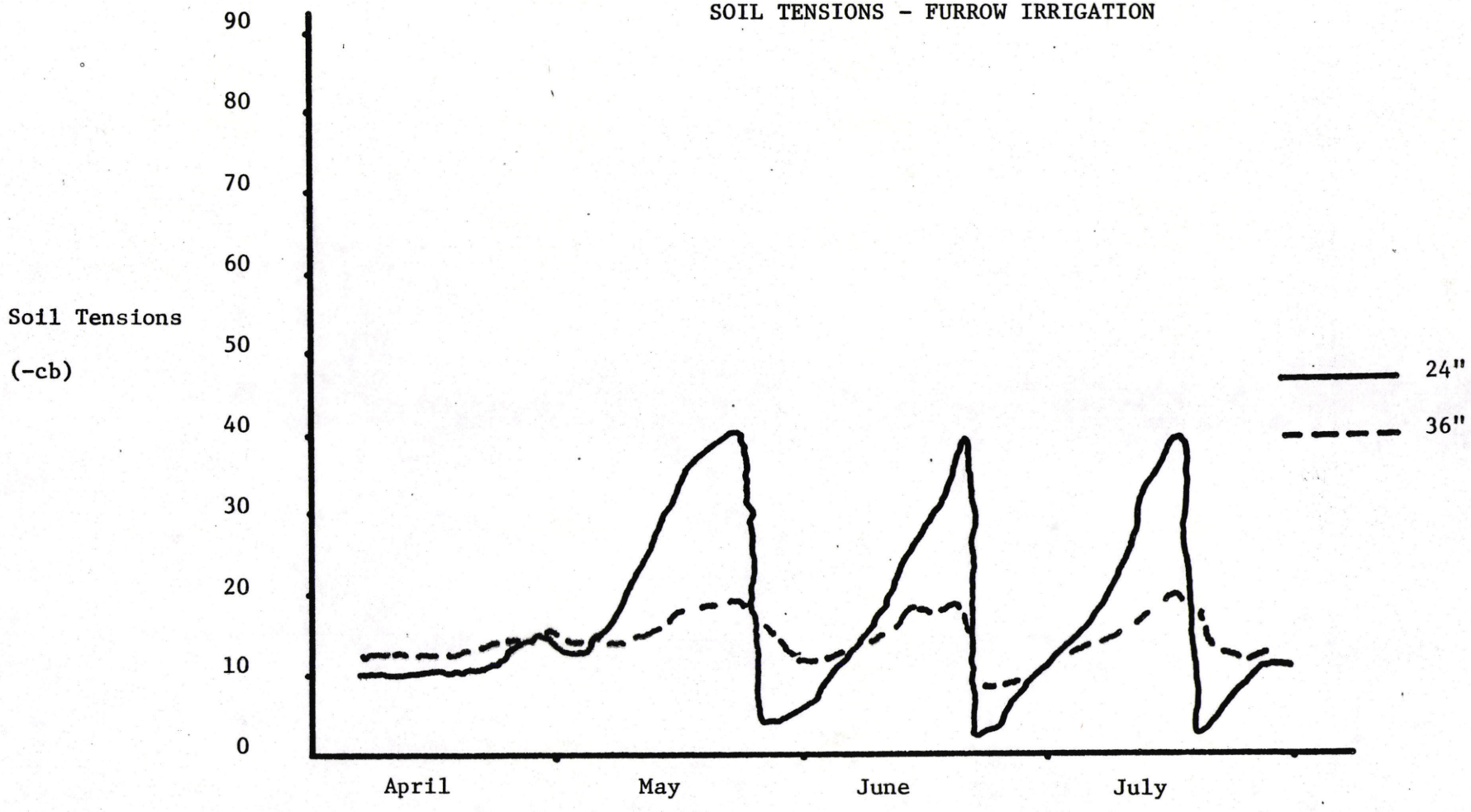


$\frac{2(HxW)}{2(HxW)_{max.}}$ / K_c	0.27/0.60	0.60/0.72	0.79/0.65	0.91/0.60	1.00/0.50	1.00/

SOIL TENSIONS - DRIP IRRIGATION

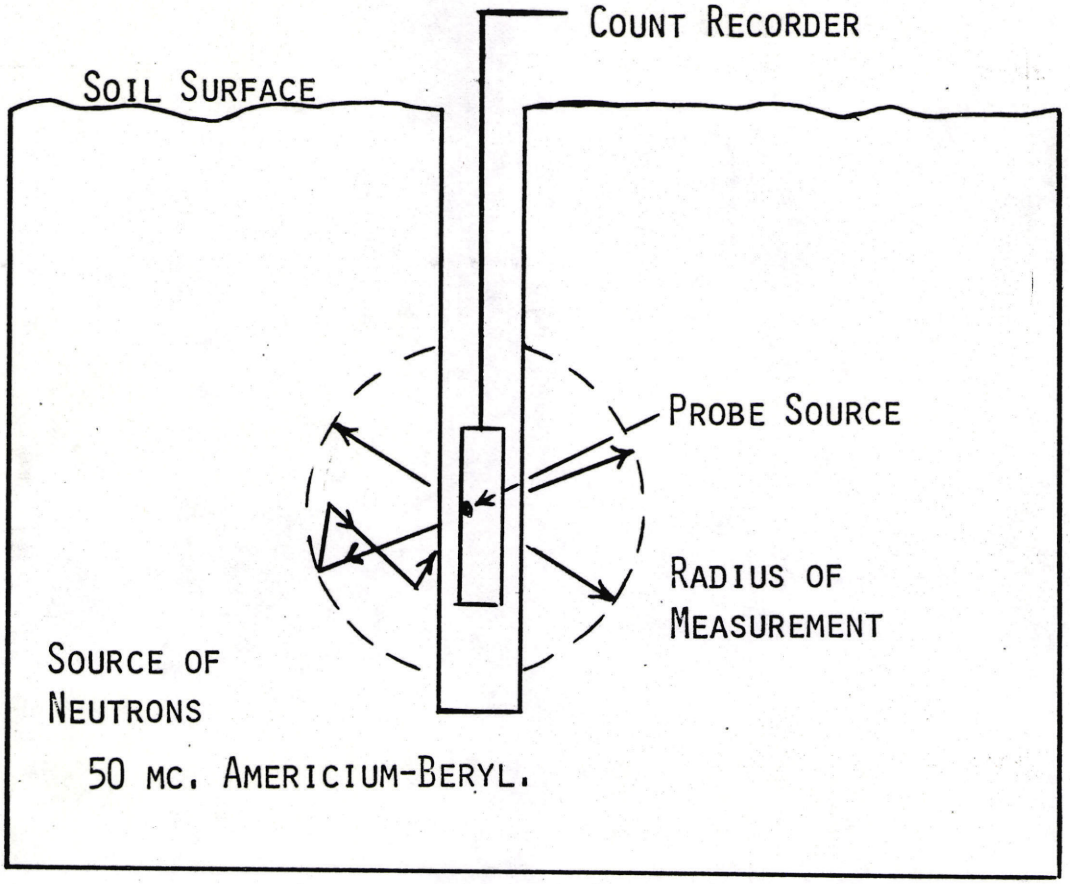


1979


SOIL TENSIONS - FURROW IRRIGATION
Soil Tensions
(-cb)
90
80
70
60
50
40
30
20
10
0
24"
36"
April
May
June
July
1979

Soil Moisture Measurement With the Neutron Probe

F. K. Aljibury, Area Soils and Water Specialist
J. Huntamer, Staff Research Associate



Fast neutrons are emitted from the source which is imbedded in the probe. These neutrons will collide with water molecules in the soil, slowing the neutrons. A small percentage of the slow (thermal) neutrons will enter the detector tube located in the probe. The detector tube is only responsive to slow neutrons, and sends signals to the count recorder when slow neutrons are detected in the detector tube. These signals or responses are counted, and the number read at the end of a counting period will be expressed in counts per time period, usually 30 or 60 seconds. A standard curve (moisture content vs. counts) is used to relate counts to corresponding moisture content.

*Presented at U. C. Grape Day, August 16, 1979.

DRIP SYSTEM CLOGGING*

F. K. Aljibury
Area Soils and Water Specialist

Clogging is considered the most serious single problem in drip irrigation. It can occur at any part of the system: filters, lines, and emitters. The only solution to clogging is to introduce clean water and to prevent the development of clogging material.

There are three principle types of clogging material; physical, chemical and biological. The physical material include sand, silt, clay and other debris washed into canals or chipped off pipes and other conveyance systems. The Soil Conservation Service has divided the mineral particles according to their size as shown in Table 1.

The chemical particles precipitate out of the irrigation water. High levels of calcium and bicarbonates favor disposition of lime which can cause partial or total clogging. Gypsum could also precipitate from water saturated with calcium and sulfate ions. Some aquifers contain iron oxide which tends to precipitate and causes clogging. The injection of phosphate or complex fertilizers into high pH water precipitate compounds that could clog the drip system.

The biological problems discussed here include algae and slime. The algae is caused in canals or develops in the reservoirs. The slime is caused by bacteria that function in water under favorable atmospheric conditions.

SOLUTION:

Several single treatments are often not adequate to provide the necessary solution for the drip irrigation problem because many of these problems are specific to a given set of conditions. Procedures to follow in filtering the irrigation water and in correcting the clogging problems differ with different sources and components. Specifically the solution to these problems differ in accordance with the type of a problem to be anticipated. Commonly the solutions are divided into three systems: namely, physical, chemical and biological.

Physical solutions include the deployment of adequate filter material systems. These systems include the utilization of sand separators or sand

* Presented at Grape Day, August 16, 1979

filters to remove the physical problems of sand silt and debris. The chemical solution entails the treatment to unclog the system from chemicals precipitating and the utilization of chemicals to avoid clogging caused by chemical-type problem. In severe cases the system may need to be flushed with 1% acid solution. Acids like muriatic or sulphuric acid could be used. For less severe cases injection of acid to bring the water to p^H between 1 and 2 could be adequate. Injection of acid into the system should continue until normal rates of flow are obtained. The amount of acid to quiet, to lower the p^H of the water in question is determined by laboratory procedures. Injection of acid to water containing high p^H, high calcium and high bicarbonates is often done to avoid the precipitation of lime in the drip system. Oftentimes reduction of the water p^H to 5.5 result in adequate control of the lime problem.

To what extent the water p^H need to be lowered to avoid lime precipitation requires careful field observation and judgment by the field manager and the laboratory chemist. Whenever acid compounds are used, extreme cautions must be exercised to avoid damage to the irrigation system and to the user. Subsequent to the utilization of acid chemicals complete flushing of the system is necessary to eliminate damage to the irrigation components.

When slime and algae clog the drip irrigation system strong oxidants are needed to unclog the components and reduce the organic substances to ashes and gas. Most commonly chlorine gas and hypoclorite solutions are used. To oxidize the accumulated organic substances concentration of 20 PPM to 50 PPM depending upon the severity of the problem are often maintained for forty-five minutes. In addition to chlorine, acrolein compounds are used. If acrolein compounds are used it is suggested that the manager checks with the local authorities about the registration of these chemicals into specific crops. Acrolein of the concentration of 50 PPM is often used, once or twice in accordance with the severity of the clogging problem. Chlorine and acrolein compounds are very dangerous chemicals and extreme caution must be observed with their use.

For maintenance program, chlorine is often injected at the rate of 1 PPM residual. Acrolein is used for maintenance program at a concentration

of 10 PPM injected every irrigation during the last forty-five minutes of the system operation. Choices between the use of chlorine and acrolein depends on cost and safety.

Periodic flushing of the drip irrigation system is recommended. Such flushing could be done automatically if automatic valves are designed. For small systems manual flushing could also be used.

When chemicals are used to unclog the drip irrigation systems or for maintenance programs it is recommended that they are used prior to the filter. Using them at a point proceeding the filter would avoid the accumulation of organic and other substances into the filter. Caution must be exercised to insure that the chemicals used will neither damage nor deteriorate the function of the system. It is the responsibility of the manager to check with their laboratories to make sure that the chemicals used are the concentrations and the frequency are legal and proper.

TABLE 1 Particle Size Distribution

PARTICLES Name	PARTICLES Size M.M.	Microns	SCREEN SIZE Mesh
Gravel	Over 2.0	2000	
V. Coarse sand	1.0	1000	18
Coarse sand	o.5 -1.0	500-1000	35
Medium sand	0.75 -0.5	250-500	60
Fine sand	0.10 - 0.25	100-250	170
Fine sand	0.05 - 0.10	50-100	270
Silt	0.002 - 0.05	2-50	
Clay	0.002	less 2	

EFFECTS OF LONGTERM USE OF PREEMERGENCE HERBICIDES AND CULTURAL PRACTICES ON GROWTH, YIELD AND COMPOSITION OF THOMPSON SEEDLESS GRAPEVINES

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The original objectives of this five-treatment (A,B,C,D, and E) cultural trial have been concluded. One of these objectives was to investigate the beneficial or detrimental influence of continuous non-tillage on vine productivity. Five cultural treatments were compared: (A) complete herbicides between and in rows with no cultivation; (B,C,D) clean cultivation in the centers with vine rows French plowed or herbicide treated; and (E) permanent sod with herbicides in vine row.

The A treatment, i.e. complete non-tillage, has consistently given the highest yield although not always statistically higher in every year. The important conclusion to be drawn from this study is that there were no observable detrimental effects of continuous non-tillage in this Hanford fine sandy loam with a history of poor water penetration. Water penetration is usually good after the first cultivation but by the next irrigation water penetration is poor unless recultivated. However, in this longterm trial with continuous noncultivation, water penetration became normal by the second or third year. In this grape trial and other non-tillage orchard trials, non-tillage has <u>not</u> been detrimental to growth or water penetration here at Kearney and at several other locations.

With non-tillage, perennial weeds will build up as can be seen in these plots with Dallisgrass. However, with Roundup now being registered for grapes, perennials can be controlled. Dallisgrass appears to be somewhat resistant to Roundup and another herbicide may be needed if this weed predominates. Bermudagrass and johnsongrass are easily controlled with Roundup.

Yield and quality data were not grossly affected. If any differences occurred there was no obvious indication of detrimental effects of complete non-tillage. There were indications of beneficial effects from non-tillage, i.e. complete chemical control of weeds.

AVERAGE YIELDS, TOTAL SOLUBLE, AND PRUNING WEIGHTS

FROM KHFS CULTURAL STUDY, FIELD 37[a]

	Crop yields (kg/vine)					
Cultural treatment	1973	1974	1975	1976	1977	1978
Clean cultivation	36.1A	27.3A	25.9A	36.4A	24.6A	26.9A
Herbicides, no cultivation	37.8A	27.9A	25.2A	37.4A		
Permanent sod	30.6B	21.6B	22.1B	34.0A	21.1A	23.7B

	Total soluble solids (^{o}Brix)					
	1973	1974	1975	1976	1977	1978
Clean cultivation	20.08A	21.12A	21.89A	19.1A	21.2A	20.3A
Herbicides no cultivation	20.52A	21.38A	21.97A	19.1A		
Permanent sod	20.38A	21.52A	22.45A	19.5A	21.3A	20.6A

	Pruning weights (kg/vine)					
	1973	1974	1975	1976	1977	1978
Clean cultivation	3.43AB	4.82	3.47AB	3.49AB	4.63A	4.20A
Herbicides no cultivation	3.95B		3,82B	3.66B		
Permanent sod	3.20A	4.23	3.34A	3.02A	3,99B	3.58B

[a] Means followed by the same letter within a column are not significantly different at the 5% level using Duncan's Multiple Range Test.

The effect of sponge mop applications of three herbicides on dallisgrass in a Thompson seedless vineyard (425-73-502-10-79).

Herbicide	Percent by Weight	Average[1/] Dallisgrass Control
Roundup	5%	10.0
Roundup	10%	10.0
Roundup	20%	10.0
Bueno 6	5%	8.0
Bueno 6	10%	9.3
Bueno 6	20%	10.0
Weedazol	5%	2.7
Weedazol	10%	5.0
Weedazol	20%	4.3
Check	-	0.0

1/ Average of 3 replications where 0 = no effect and 10 = complete control. Treated 7/27/79. Evaluated 8/14/79.