Furrow Size,

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Size and placement of furrows, and the use of grass culture can have a marked effect on irrigation water penetration rates, according to these tests in Fresno County vineyards.

PREVIOUS VINEYARD TRIALS have shown that additions of gypsum, or soil sulfur, temporarily improved penetration of irrigation water into some nonsodic (nonalkali) east-side Fresno County soils. However, once much of the soil amendment was leached from the soil surface with several irrigations, there was no longer any water intake improvement and the treatments did not last beyond midsummer. A grass-culture treatment in the same study improved water penetration from midsummer on, however.

Further study on the problem of slow water intake into vineyard soils was continued in 1966 and 1967 at the U.C. Kearney Horticultural Field Station near Reedley. The purpose was to further evaluate practices which might give more ef-

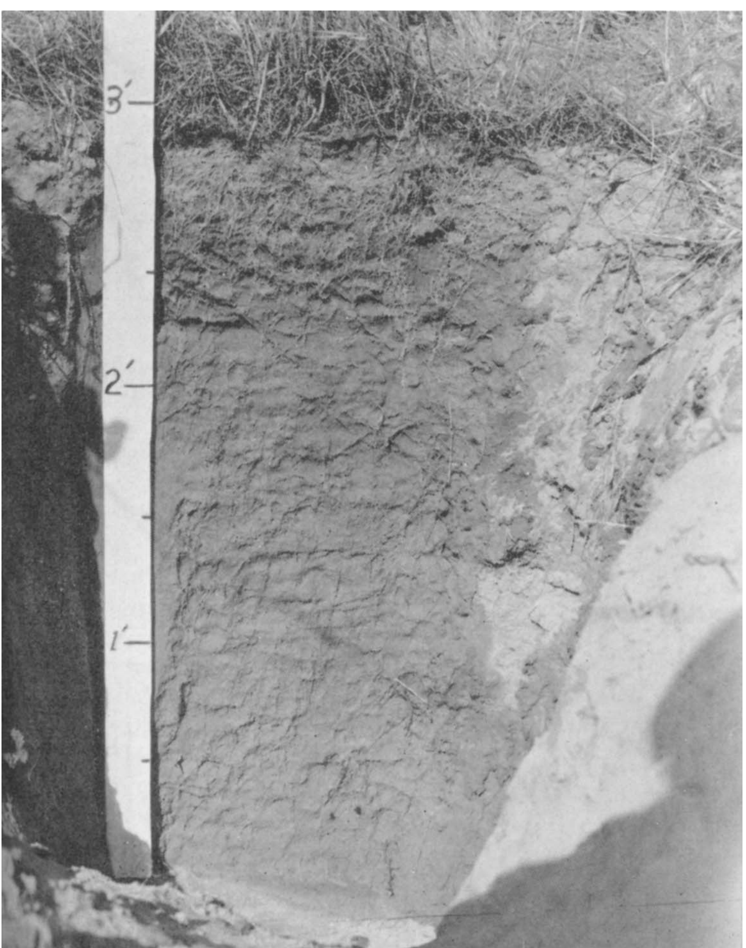
Photo series showing each of five treatments during the July 20, 1966 irrigation measurement. Operator is measuring water head loss at orifice plate to determine water flow into the row: (1) check, flat furrow; (2) flat furrow + sod; (3) check, middle row basin; (4) basin + sod; and (5) undervine basin.

Placement, and Grass Culture Effects on Vineyard Irrigation

fective, more economical, or longer lasting improvements in water penetration than given by chemical soil amendments. The test plots were established in a 30-year-old vineyard on a Dinuba fine sandy loam soil and included: (1) flat furrows with clean cultivation; (2) flat furrows with grass culture; (3) a wide, middle-row basin with clean cultivation; (4) a wide middle-row basin with grass culture; and (5) a wide furrow under the vine row. Each treatment was replicated four times in the experiment.

The grass culture plots were established by seeding annual ryegrass in the permanent furrows and basins on February 24, 1966. By early summer the grass nearly stopped vegetative growth except for seed-head development. The grass required only two mowings during the growing season and proved to be quite satisfactory for a vineyard sod. The clean-cultivation treatments were disked and harrowed, and the furrows and basins re-established between the second and third irrigation measurements. The wide, undervine furrow was established in early spring by French plowing and then following with a blade to widen the furrow.

Water penetration in each plot was determined by the amount of water penetrating a 200-ft section of the furrows and basins—approximating actual field infiltration rates. Water flow into and out of the furrow section was measured with tube-orifice plates and an electric-point gauge. The measurements were made in each plot during four irrigations in 1966. In 1967 a comparison of the clean-cultivation and the grass-culture flat furrows was made during one irrigation only. This 1967 measurement was to evaluate the carryover effects of an undisturbed grass or sod condition into the second year.



Root development to 3-ft depth in annual ryegrass sod. Basin plus sod treatment, August 30, 1966. Note mass of fibrous roots in first foot from surface.

Undervine irrigation benefits

The data, as graphed, show the excellent water penetration into the undervine furrows, as compared with row middles throughout the 1966 season. Undisturbed soil cores taken from under the vines, and in the check furrows, showed higher volume weights in the furrows (reflecting a measure of soil compaction from traffic between vine rows). Compacted soils have lower permeability than noncompacted soils. The soil samples from under the vines had water-infiltration rates about four times those of the check furrow samples.

Many growers have used undervine furrowing with a French plow to assure thorough wetting of the soil during the spring irrigation, as vine growth begins. Some Fresno County table-grape growers have also used an undervine furrow throughout the season to assure water penetration in "tight" soils. An additional "V"-shaped furrow is used in the row middles under this system. This leaves two ridges of soil spaced for tractor wheels and equipment to travel on. Thus, equipment does not travel in furrow bottoms and further compact the soil where water is being applied. These table-grape growers have reported easy access of equipment into the field very soon after irrigation in addition to improved infiltration and wetting of soils.

The wide, middle-row basin was also shown as beneficial, though not as advantageous as the undervine furrow. In the first irrigation the basins gave a higher water intake into the same-sized area as the flat furrows, possibly because the wide basins included surface area not previously subjected to direct traffic and irrigation. However, later in the season, the advantage of the basin over flat furrows merely came from its greater surface area for water intake.

Grass Culture

The grass culture nearly doubled the water intake rate in the furrows and basins from mid-summer on, in 1966 (presumably after a sod-condition developed). Thus, the basin system under grass-culture was the second best treatment, after undervine irrigation, in 1966. The following year, 1967, the undisturbed sod gave an even greater water intake over clean cultivation—more than a fourfold increase—indicating increasing sod benefits with time.

Many table grape growers presently use natural grasses such as watergrass and crabgrass, which are mowed as needed. Benefits in addition to better water intake include: less dust for cleaner fruit and working conditions, reduced sun reflection in the vineyard, and possibly fewer spider mites. Flat furrows are most often used by growers, but there is a trend toward increased use of wide, middle-row basins to further assure adequate wetting. This system seems most practical in wine and table grape vineyards where special ground preparation at harvest is not necessary, as in raisin vineyards. Some raisin growers have used a temporary undervine furrow until early-to mid-summer before plowing the soil back to the vines—assuring good water intake for at least this period during the season.

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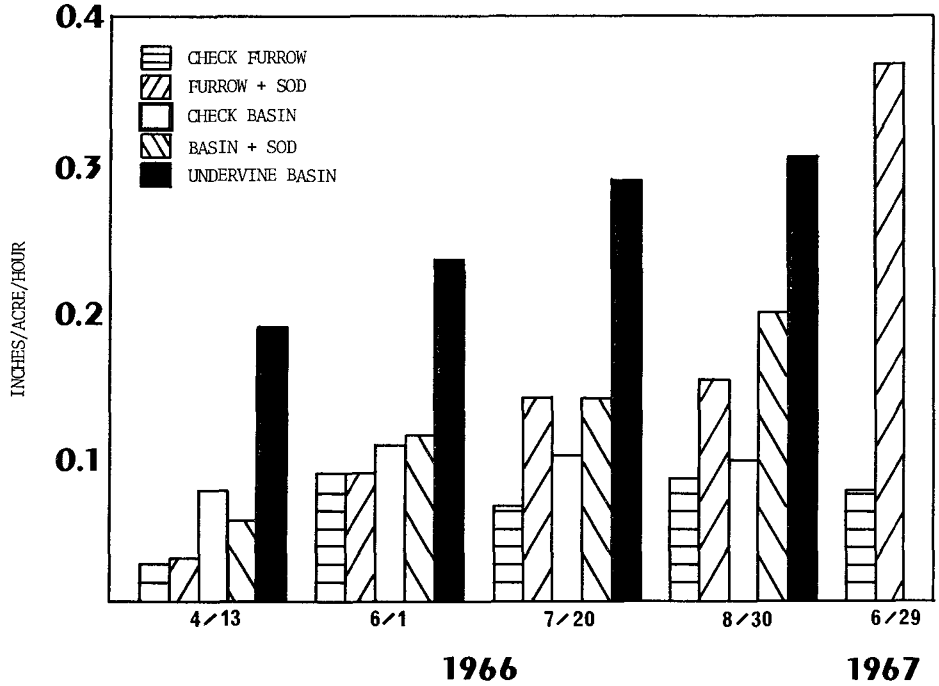
PENETRATION RATE OF IRRIGATION WATER APPLIED TO FRESNO COUNTY (EAST SIDE) VINEYARD SOILS UNDER FOUR DIFFERENT FURROW SYSTEMS—1966 AND 1967



TWO-SPOTTED MITE CONTROL IN WALNUTS

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COMPARISON OF THREE OILS, FIVE ACARICIDES AND SIX ACARICIDE-OIL COMBINATIONS FOR THE CONTROL OF TWO-SPOTTED MITE ON ASHLEY WALNUT TREES

Treatments	Mite population counts (pretreatment)					Average observed phyto-toxicity†
	9/14	9/21	9/26	10/4	10/12	9/26
Dosage/100 gal water*	Average no. mites per leaflet					Rating*
PGSO-2, 1 gal	64	16	17	36	91	2.0
Orchex 796, 1 gal	40	14	22	61	46	2.0
Volch Supreme, 1 gal	76	13	11	22	43	2.0
Volck Supreme, 1 gal plus 1 lb 25% Ethion WP	5	4	5	10	42	2.0
Ethion 1 lb 25% WP	151	52	92	218	424	1.0
Volck Supreme, 1 gal plus 1 lb 25% Trithion WP	115	3	0	12	42	2.2
Trithion, 1 lb 25% WP (Carbophenothion)	73	3	21	56	134	1.3
Volck Supreme, 1 gal plus 1½ lbs 25% Chlorobenzilate WP	39	14	4	11	40	2.2
Chlorobenzilate, 1½ lbs 25% WP	98	4	5	23	22	1.0
Volck Supreme, 1 gal plus 2 lbs 18½% Kelthane WP	48	0	2	3	8	2.2
Orchex 796, 1 gal plus 2 lbs 18½% Kelthane WP	30	0	1	2	8	2.8
PGSO-2, 1 gal plus 2 lbs 18½% Kelthane WP	37	2	5	6	11	1.8
Kelthane, 2 lbs 25% WP (dicofol)	74	5	6	13	10	1.2
Omite, ½ pt EC (5 lbs per gal)	125	0	1	4	2	1.0
Check (water)	64	85	112	176	333	1.0
Check	41	149	81	106	328	1.0

* Sprayed September 14, 1967, by hand gun.
† Ratings 1 to 10: 1 = no damage, 5 = serious leaf spotting, 10 = dead leaves.

The TWO-SPOTTED MITE, *Tetranychus urticae*, has been very difficult to control during the past three hot summers. Walnut growers in Merced County, as well as in many other interior valley counties, have experienced early loss of leaves from walnut trees, sunburning of nuts and limbs, and problems with leaves on the ground at harvest.

In recent years, mite-control failures have become quite common with the organic phosphate acaricides such as TEPP, Trithion, and Ethion. Some growers have reported failures with the chlorinated hydrocarbon acaricides such as Tedion, Kelthane, Chlorobenzilate and Aramite. As the standard acaricides have in some cases lost their effectiveness, growers have become more interested in the recently developed plant spray oils. However, little information of a local nature has been available on the effectiveness of these oils, and little was known about the phytotoxicity or plant-damaging qualities of these oils on walnut trees.