Fruit Sizes of Prunes

as influenced by differences in set and irrigation treatment

A. H. Hendrickson and F. J. Veihmeyer

Prunes are an excellent subject for studies on the relations between controlled soil-moisture conditions and sizes of fruit.

Prunes continue growth until comparatively late in the season and, as a rule, are not thinned. The entire crop is harvested, and it is easy to obtain the size grades of all the fruits, including those ordinarily classed as culls.

In 1947, a prune orchard at Davis devoted to irrigation experiments presented an excellent opportunity to study the effect of irrigation, or the lack of it, on the sizes produced.

Considerable variation in the natural set of fruit occurred among the replications and the different treatments. Some plots in the irrigated treatments produced moderate crops while others produced light ones. Approximately similar variations occurred in the unirrigated treatments. In no case was the set of fruit so great that sizes were reduced by numbers alone, as is sometimes the case with heavy crops.

Test Trees

The trees are growing in a Yolo loam having a field capacity of about 22% and a permanent wilting percentage of 11%.

The trees are 24 feet apart on the square system, and were 24 years old when the records were obtained.

The unirrigated plots, seven in number, received no water while the crop was on the trees, and the readily available moisture, from the winter rains, was exhausted to a depth of six feet about the middle of July.

Three of the irrigated plots received four irrigations each with a total of about 24 acre inches per acre before the crop was harvested. The soil-moisture contents in these plots did not go below 13% or 14% in the top six feet during the growing season.

The fourth irrigated plot—plot No. 5—was watered 10 times during the season with a total of 96 acre inches per acre. This plot was irrigated so frequently that the soil was saturated for a considerable portion of the season. Irrigation of this plot ceased about two weeks before harvest to permit the soil to become dry enough for the harvesting operations. The crop from this plot—No. 5—was harvested during the third week in August.

After picking, the prunes were dehydrated in the usual manner and run over a size grader. The dried fruit was separated into seven sizes, from which the weights and numbers of each size were obtained. The term "large prunes" as used here refers to the fruits in the three largest size grades.

The average number of prunes per tree showed considerable variation, but the magnitude of variation was about the same in both treatments.

The largest average number of fruits in the irrigated plots was slightly over 6,000 fruits, that in the unirrigated about 7,500 fruits with several plots about 6,000 fruits each.

The lowest set in the irrigated plot was 967 fruits per tree, and in the unirrigated, 1,730.

The average number of fruits in the irrigated plots was about 4,000 per tree while in the unirrigated, it was about 5,000. Thus, the unirrigated trees averaged a larger number of fruits than the irrigated.

Yields

Inasmuch as the unirrigated trees were smaller than the irrigated ones, the number of fruits per square centimeter of trunk cross-section area was computed. The number of fruits per square centimeter of trunk cross-section area in the irrigated plots varied from 14 to 81 with an average of 54, while the unirrigated ones varied from 28 to 118 with an average of 77. The difference between these averages is not significant. In neither case was the set disproportionately heavy for the leaf area involved.

Although the unirrigated trees had a larger average number of prunes than the irrigated ones, the final results showed that the yields in pounds of the former were slightly less than those of the latter. The irrigated trees also had a slightly greater average yield per square centimetre of trunk cross-section area than the unirrigated ones. These differences are not statistically significant. The data on yields of all sizes are included, not to indicate the merits of irrigation so far as total yields are concerned—as these results are best studied over a long period of time—but to show the relationship between irrigation treatment and the production of large sizes under conditions where there is a considerable variation in the set of fruit.

Fruit Growth

Previous results with prunes and other fruits have shown that fruit on trees supplied with readily available moisture continue to grow at a normal rate until attaining full size, while fruit on trees that have exhausted the available supply of

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Frequent irrigation of prune orchards does not necessarily mean the production of large fruits.

Yields of Wheat or Barley

on root-rot infested soils may be increased by rotation with oats or rye

Coit A. Suneson and John W. Oswald

The root-rotting fungus—*Ophiobolus graminis*—thrives on wheat and barley but not on oats or rye.

In field tests, wheat was the least productive of the grains, when planted on soil which previously produced either wheat or barley. Best yields accrued from following wheat or barley with oats or rye, or from following oats or rye with wheat or barley.

In 1946, randomly distributed plots of wheat, barley, oats, and rye were drilled in a given area at Davis. Root rots seriously damaged the wheat and barley plots but did not damage the oats or rye. Then in 1947, these same crops were drilled on the same land area at right angles to the previous crop.

The yield data from the checkerboard tests are shown in the accompanying table.

In addition to the root-rot effect, all yields in 1947 also reflect the proportion of 1946 rainfall and available nutrients not taken from the soil by the crop grown in that season. Since the 1947 crop yields reported involved both grain and straw, rye—a tall stemmy plant—shows some advantage over oats. In most areas of the state this advantage for rye over oats will probably not prove real.

	1947 crop yield in grams per sq. foot			
1946 crop	Wheat	Barley	Oats	Rye
Wheat	8*	29	51	55
Barley	8	30	54	58
Oats	42	52	42	51
Rye	45	57	48	54
Fallow	70	..	..	..

* Difference required for significance: 5 grams at 5% level.

Root rots are not a particularly new disease since they have been known to occur on some grain lands of California for about 25 years. They operate variously, sometimes even killing seedlings. Frequently several similar acting fungi may be present in the same field.

Severe damage is most readily detectable after heading. The more severely diseased plants will stool poorly, be shortened, and the roots, crown, and lower stem will be browned or blackened by the parasite. The plants dry up prematurely, particularly in a dry year like this.

In only two areas in the state have farmers been forced—through severe decline of wheat and barley yields such as here reported—into rotating between oats and wheat or barley. Those areas are the Montpelier section of Stanislaus County, and the Montezuma hills and some contiguous Solano County delta land where there is a complex of root-rot fungi.

The actual yield advantage from rotating with oats approximates the results here reported from Davis.

There is reason to believe that other sections or individual farms long cropped only to wheat or barley might profit from growing oats. It must be emphasized, however, that when root rots are not doing serious damage, barley or wheat generally yield better than any presently available oat variety. Diagnosis therefore is important. Severe browning of the lower stem and extremely poor growth of wheat or barley in comparison with wild oats are symptoms farmers can use. Beyond this point, the farm advisor can be helpful.

Agronomists at Davis are working to produce a higher yielding oat variety. Pathologists meanwhile are giving increased attention to identification and to possible control measures for the various root-rot fungi. For the grain farmer with a root-rot problem the only presently known relief involves alternate cropping with oats or rye.

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moisture decrease in rate of growth. The data show that the trees in the irrigated plots produced a considerable proportion of large-sized fruit, while the unirrigated ones produced only a small percentage.

The results from the unirrigated trees show that in no case was there more than 9.5% of large sizes even from the trees bearing very light crops.

The lack of readily available moisture before the fruit reached full size overshadowed any benefit as far as size is concerned that might have been expected from a light set. On the other hand, the percentage of large sizes from the irrigated trees bears almost a linear relationship to the number of fruits per tree. It is interesting to note that plot No. 5, which had 3,737 fruits per tree, produced 69.3% of the large sizes.

These results are in keeping with the results from the other irrigated plots even though plot No. 5 received about four times as much water as the others.

Apparently, the percentage of large-sized prunes was not increased by the use of excessively large amounts of water.

YIELDS AND SIZES OF FRENCH PRUNES IN 1947

Plot	Av. no. of prunes per sq. cm. trunk cross-section	Av. fresh wt. yields in lbs. per sq. cm. trunk cross-section	Av. no. prunes per tree	Av. fresh wt. yields in lbs. per tree	Percentage of large sizes
		Irrigated			
5	6.4	0.323	3,737	188.1	69.3
17	10.2	0.424	6,185	257.1	29.5
29	9.3	0.386	5,490	228.9	47.6
56	1.8	0.090	967	49.8	88.4
		Unirrigated			
14	9.8	0.259	4,508	136.3	5.8
41	3.5	0.081	1,730	39.9	2.9
50	5.9	0.141	3,051	72.4	2.9
8	11.6	0.309	5,745	152.0	9.5
23	14.8	0.420	7,535	214.0	7.2
32	11.2	0.289	6,001	154.3	4.6
44	13.0	0.301	6,601	152.3	3.1

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A study has been made by the Division of Dairy Industry concerning the type of fruit and the best methods for incorporating fruit in ice cream.