STUDY OF THE INFLUENCE OF GRAPE MATURITY ON THE QUALITY AND YIELD OF RAISINS

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California produces approximately 200,000 tons of raisins a year. Natural, or sun-dried, raisins produced from the Thompson seedless grape accounts for a large proportion of this tonnage. With the ever-present threat of rainfall during the drying season and a problem of inadequate labor supply, the tendency has been to pick the grapes for drying earlier in the season. Knowledge of what effect this has on the yield and on the quality of the dried raisins is important to the grower, processor and consumer.

Jacobs in 1944 published results of data collected in 1926, '27, '35, and 1936. In this study he established that the drying ratio, i.e. pounds fresh grapes required to produce one pound raisins, was influenced by the soluble solids content of the fresh fruit. Since this work was carried out in the Sacramento Valley (Davis, California) 30 - 40 years ago, a study was instigated in 1962 in which the findings of Jacobs might be compared to those found in the raisin producing San Joaquin area (Fresno and Madera Counties). Farm advisors of Fresno and Madera Counties selected vineyards at several locations and prepared sample trays of grapes varying in soluble solids content and in date of harvest. Conclusions drawn on data collected during the 1962 season were reported in the Proceedings, Fourth Annual Research Conference, Dried Fruit Industry Research Advisory Committee Meeting, in Monterey, California, June 24, 1963.

The present report includes the findings of the work done during the 1963 season. The 1962 season was ideal for the growing of grapes and for the drying of raisins having a hot dry period during the time the raisins were drying. Conditions in 1963, on the other hand, were very different in that the growing season was relatively cool and rains actually fell during the drying period. The agreement between the soluble solids-drying ratio relationships for the 1962 and 1963 seasons was excellent even though the seasons varied. Fig. 1 shows the effect

of soluble solids content on the drying ratio of Thompson seedless grapes for the Fresno area 1962 and 1963 season. Similarly, Fig. 2 shows the same relationship for the Madera area. If combined, Figures 1 and 2 show that the curves are superimposable. The inclusion of the curve obtained from data of Jacobs, 1944, is for the purpose of comparison. Differences in techniques used in our investigation and in that of Jacobs may account for the 1.2-2.1° Brix difference between the two curves. Besides the differences in growing areas, Jacobs used a spindle hydrometer to measure the soluble solids whereas in the present studies, a refractometer was used. It has been found in the wine industry that there is approximately 0.4° Brix difference between readings as measured by spindle and by refractometer. Jacobs also dried single berries whereas the present work used entire clusters of grapes. The weather was such in the Davis area that the high soluble solids samples, which were collected quite late in the season, actually had to be dehydrated to bring the moisture content of the raisins down to 15%. One other factor which is quite difficult to assay as to its effect is the differences in cultural practices which existed in the mid 1920's and 1930's as compared to the practices of today's growers.

The effect of soluble solids content upon individual berry weight of the dried fruit is shown in Fig. 3. The data for the Fresno area was combined since the vineyards used were quite similar. Data obtained from the Madera area, however, were separated because the Madera "K" vineyard was an old established vineyard whereas Madera "M" was a young vineyard just coming into production. The indications drawn from these findings were that the size and weight of berry both increased in the old established vineyard,whereas in the newly bearing vineyard, the soluble solids increased to a high level but the physical size of the berries did not. While volume measurements were not made on either the fresh or dried fruit, the findings presented in Fig. 3 indicate that while berry size is influenced by the condition of the vineyard, the soluble solids-drying ratio relationship shown in Figures 1 and 2 is linear and is more or less independent of vineyard condition.

An examination of the influence of date of harvest per se shows no apparent influence upon the drying ratio. However, the soluble solids content does, not only on the drying ratio, but also on berry quality (as measured in the air stream sorter which divides the dried berries into C-, C, and B and better raisin grades). Comparisons between samples of raisins harvested from vineyards at several soluble solids contents and various harvest dates are shown in Table 1. While the data shown represent only a few selected samples, the results are similar for all samples collected in the studies.

In the summary, the 1962 and 1963 raisin seasons had quite different climatic conditions so data collected was subject to seasonal variation. Comparing the effect of soluble solids of the fresh grape to the drying ratio of raisins, showed that data collected in 1963 were superimpossible on data collected in 1962. The date of harvest had no apparent influence on drying ratio. The relationship of soluble solids to berry weight of the dried raisins appears to be influenced by condition and age of the vineyard. Quality of the raisins as measured by the air stream sorter shows an increase in percentage of B grade and better with increasing soluble solids.

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(June 15, 1964)

Effect of Harvest Date and Soluble Solids

on the Drying Ratio and Raisin Quality

(1963 Season)

Table I

Harvest date	Vineyard	Soluble Solids (%)	Drying ratio	Raisin Grades (%) C-	C	B & Better
9/2	P	17.0	5.11:1	6.6	36.8	56.6
9/2	P	21.2	4.14:1	1.6	4.6	93.8
9/12	P	21.4	3.93:1	3.6	2.0	94.4
9/5	C	19.1	4.54:1	3.4	21.4	75.2
9/5	C	21.8	3.94:1	2.4	7.4	90.2
8/27	M	17.8	4.61:1	7.4	26.8	65.8
9/5	M	18.3	4.67:1	4.2	24.8	71.0
9/5	M	21.3	3.85:1	3.6	7.8	89.6

Figure 1

Effect of Soluble Solids Content on the
Drying Ratio of Thompson Seedless Grapes
(Fresno Area, 1962 and 1963)

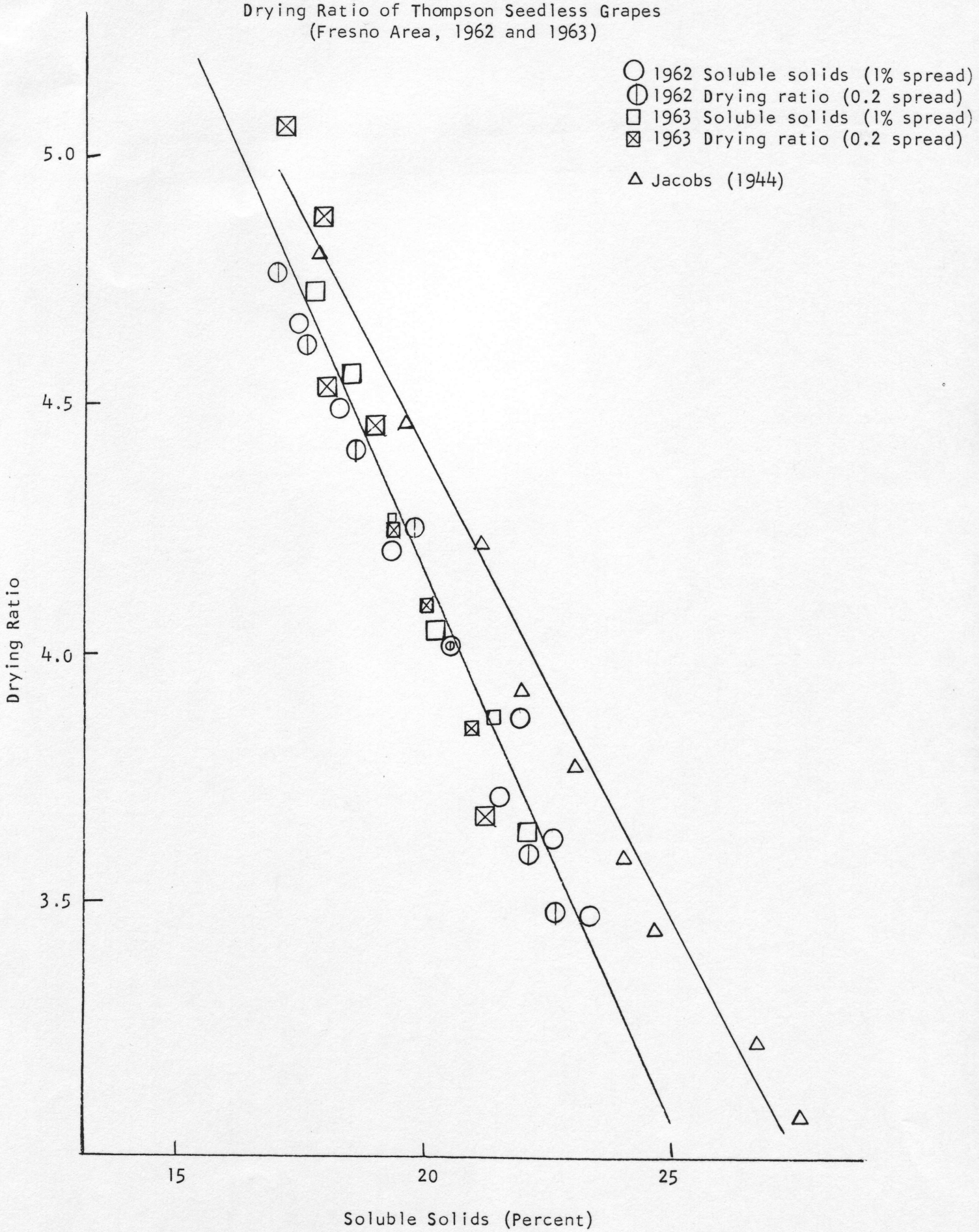

Figure 2

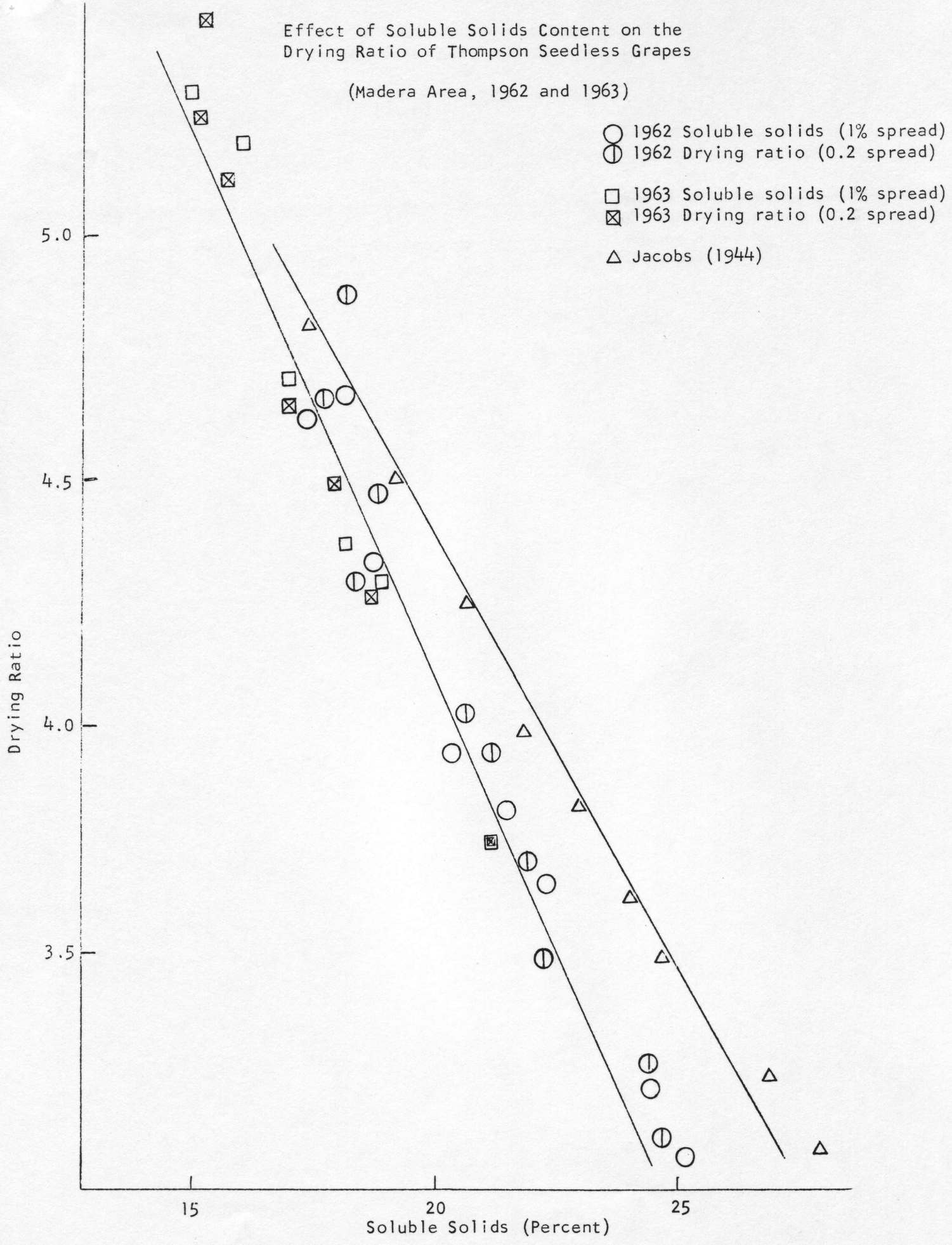
Effect of Soluble Solids Content on the
Drying Ratio of Thompson Seedless Grapes
(Madera Area, 1962 and 1963)
1962 Soluble solids (1% spread)
1962 Drying ratio (0.2 spread)
1963 Soluble solids (1% spread)
1963 Drying ratio (0.2 spread)
Jacobs (1944)
5.0
4.5
4.0
3.5
Drying Ratio
15
20
25
Soluble Solids (Percent)

Figure 3

Effect of Soluble Solids Content

of Thompson Seedless Grapes on Raisin Berry Weight

(1963 Season)