Composition of Juice of French Hybrid Grapes Grown in New York

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The grape breeding program of the New York State Agricultural Experiment Station has included the growing of a large number of varieties from all grape growing areas of the world. This material is evaluated not only for its potential use in the hybridizing program but also for possible inclusion in the list of varieties recommended for planting in New York.

One group of such material is made up of hybrid grapes produced by Swiss, French, German, and Italian viticulturists and plant breeders. Their work was motivated by the same desires underlying much of the American grape breeding program, namely, to develop individuals bearing fruit of vinifera quality and character on vines having the stamina, hardiness, and resistance to pests of the American species.

The first introduction of French hybrid grapes by the New York State Agricultural Experiment Station was made more than thirty years ago. Additional importations have been made since then up to 1940 when the advent of war stopped further shipments from Europe. About seventy-five selections of such hybrids were received for testing in the Station vineyards at Geneva and Fredonia. Most of these are designated by the name of the producer or breeder coupled with his seedling or selection number. Since many of their introductions require a long season for maturity of the fruit, the varieties selected for testing were restricted to those ripening not later than Concord. However, many which were described as ripening in early season were found to ripen as late as Catawba at Geneva, probably because they were not adapted to New York conditions.

More than sixty of these hybrids have been fruited and evaluated. Most of them have been of the wine types and are highly acid in flavor; so acid in fact that one could not tell much about their potentialities by tasting. For this reason it soon became evident that actual measurements of the sugar contents and titratable acidity would be necessary in determining which varieties might be of interest to the New York grape and wine industry. Therefore analyses for these constituents were made on samples of fruit of as many of the hybrids as were available. Similar studies were made on the fruit of eight varieties of American grapes which are widely grown in New York and which are used for making wines in that state.

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Materials and methods: Most of the varieties included in the study were growing in the Experiment Station vineyards at Geneva, N.Y. A few were growing in the test plots of the Vineyard Laboratory at Fredonia. When fruit samples of a given variety were available from both places in a given year the analyses from those two locations were averaged to give the data for that variety in that year. In general, the performance of a variety growing at Geneva was similar to the performance of that variety at Fredonia in the same year so long as equal opportunities for maturity prevailed at both places. The number of vines of each variety included in the plantings ranged from two to forty. Five clusters of fruit were harvested from each variety at the time of optimum maturity. Average clusters were selected from the shoots growing on the upper wire of the trellis. If five or more vines of a variety were available not more than one cluster was taken from any one vine. The fruit was taken to a cold storage room shortly after being harvested and was held at 34°F. until the analyses could be made.

Acid and Sugar Determinations

Analyses were made on the juice expressed rather than on the entire berries themselves since past experience elsewhere has shown that this method of analysis gives results identical with those obtained on macerates of the berries.

The grapes were crushed and the pomace was squeezed by hand through a finely woven linen cloth until no more juice could be obtained. The acidity was determined by titration with 0.10 N sodium hydroxide solution using the official methods of the A. O. A. C. (1).

Total soluble solids were determined by using a Zeiss hand reflectometer. The results may be considered as a relative measurement of the sugar content of the grape varieties being tested. Kertesz (2) and others (3) (4) have demonstrated that the hand reflectometer gives results which are practically identical with those obtained with the Balling or Brix hydrometers. Three or more readings were made of each sample.

Results

The results from thirty-eight varieties of French hybrid grapes are presented in Table 1 with similar data from eight varieties of American grapes which are grown extensively in New York. The period of study included the years of 1943 through 1947. These years may probably be considered as representative of the range of seasons prevailing in western New York. 1946 was an excellent year for ripening grapes whereas 1947 was a poor year in the Geneva area, due to killing frosts on September 23 and 28. Most of the data for the latter year are for Fredonia grown samples and a few of the early ripening sorts which ripened before the frosts occurred at Geneva.

1. Association of Official Agricultural Chemists. Official and Tentative Methods of Analysis. Washington, D. C. Ed. 4, 1935.

2. Kertesz, Z. I. The chemical composition of maturing New York State grapes. N. Y. State (Geneva) Agr. Expt. Sta. Tech. Bull. 274, 1944.

3. Shoemaker, J. S. Sugar, acidity, and juice color determinations in grapes. Ohio Agr. Expt. Sta. Bull 550, 1935.

4. Teichman, L. Die Anwebdung des Zeisschen Handzuckerrefractometers in Weinbau. Der Zuchter 12:237-243, 1940.

Composition Desirable for Wine Making

Amerine and Winkler (5) have suggested the following compositions of grape musts as being most desirable for wine making in California. For dry table wines high acidity ranging from 0.60 to 0.90 percent expressed as tartaric acid with moderate sugar content ranging from 19° to 23° Balling were considered optimum. For sweet table, dessert, and appetizer wines a medium acidity of 0.40 to 0.60 percent and high sugar content of 23° to 29° Balling were considered more desirable.

Hedrick (6) recommends a sugar content of 21° to 25° Balling as being optimum for eastern varieties of grapes accompanied by acidity ranging from 0.80 to 1.20 percent as tartaric acid. Wagner (7) suggests sugar contents of 20 to 24 per cent as being most desirable for the varieties of grapes grown in the Eastern United States with acidity of 0.60 to 1.00 per cent as tartaric acid.

On the basis of these opinions the author suggests the following arbitrary standards as being one indication of the suitability of the grapes studied for use in wines: For total soluble solids a minimum of 19 per cent accompanied by acidity ranging from 0.70 to 1.00 per cent expressed as tartaric acid.

Value of Hybrids for Wine

In comparing the data for the French hybrid varieties with the above standards it is evident that only a few come within the limits of the standards set. Many are low in sugar as shown by the readings for soluble solids but the outstanding feature is the extremely high acidity shown by many. On the basis of their performances in central New York only Seibel 1000, and 5760; Malegue 2049-3 and Seyve-Villard 5-276 have met the requirements of sufficient sugar accompanied by low acidity.

Several other varieties, namely, Seibel 14, 4643, 5455, 6339, 6905, 7053, 7136 and 8357; Baco 1 and 43-23; and Seyve Villard 14-287 have sugar contents sufficiently high to fit within the range suggested but in most cases the acidity of these varieties is so high as to make them of questionable interest to the wine maker. Of course it is possible to ameliorate the composition of the must by addition of sugar and water. Wine trials conducted by commercial wineries with fruit of many of the varieties studied in this paper have shown that Seibel 2, 5898, 6339; and Baco 1 produce high quality red wines under proper ameliorating treatment.

Of course many of the varieties which show promise on the basis of sugar and acid content should be eliminated on the basis of poor cultural characteristics. This has been true of Seibel 14, 5455, 6905, 7136; Baco 43-23, Malegue 2059-3, and Seyve Vilard 14-287. Seibel 6339 which has given perhaps the righest quality and most highly colored red wine of any of the samples tested is on the border line so far as adaptability to western

5. Amerine, M. E., and Winkler, A. J. Commercial production, composition, and quality of musts and wines of California grapes. Hilgardia 15:493-673. 1944.
6. Hedrick, U. P. Grapes and wines from home vineyards. Oxford Press, New York City, 1945.
7. Wagner, P. M. A wine grower's guide. A. A. Knopf, New York Sity, 1945.

TABLE 1—Analyses of the Fruit of French Hybrid Grapes Showing the Soluble Solids Contents and the Acidity as Tartaric Acid in Per Cent.

VARIETY	Soluble Solids			Acidity			No. of Years
	Av.	Max.	Min.	Av.	Max.	Min.	Observed
Seibel X	15.8	17.6	13.9	1.64	2.01	1.26	3
Seibel XXX	17.4	21.0	15.4	1.35	1.56	1.25	4
Seibel 2	17.4	19.8	15.6	1.34	1.46	1.09	5
Seibel 14	20.2	20.6	20.0	1.54	1.61	1.49	3
Seibel 128	17.7	18.0	17.4	1.15	1.29	1.01	2
Seibel 1000	20.3	22.6	18.7	0.69	0.99	0.06	5
Seibel 2056	16.0	19.4	12.7	1.63	1.84	1.41	2
Seibel 4643	18.6	22.8	16.2	1.63	1.90	1.47	3
Seibel 4986	17.3	18.2	16.4	1.30	1.34	1.26	3
Seibel 5163	17.9	19.3	15.7	1.02	1.32	0.83	4
Seibel 5279	15.6	16.5	14.6	1.65	1.83	1.46	2
Seibel 5296	18.1	19.7	16.5	1.32	1.47	1.14	3
Seibel 5455	20.4	21.0	19.7	1.50	1.52	1.49	2
Seibel 5760	18.8	19.1	18.5	0.93	0.96	0.90	3
Seibel 5898	17.7	20.9	16.0	1.15	1.33	0.96	5
Seibel 6339	18.8	19.8	17.2	1.18	1.43	0.97	5
Seibel 6905	19.0	21.2	16.8	1.70	1.89	1.50	5
Seibel 7053	18.8	19.0	18.6	1.06	1.11	1.01	2
Seibel 7136	21.4	23.2	18.2	1.37	1.62	1.10	4
Seibel 8357	19.9	22.6	17.2	1.77	2.24	1.29	3
Seibel 8365	14.9	15.4	14.0	1.43	1.58	1.33	3
Seibel 8748	18.1	22.2	17.0	1.32	1.48	1.14	3
Seibel 8916	15.7	17.7	13.0	1.46	1.58	1.40	3
Seibel 10096	15.4	15.9	14.4	1.51	1.63	1.38	3
Seibel 13666	11.9	12.9	11.0	1.39	1.57	1.29	3
Seibel 13694	15.8	16.7	15.1	1.52	1.67	1.38	3
Seibel 14117	17.7	19.3	15.0	1.24	1.60	0.98	5
Seibel 14189	12.4	14.0	11.0	1.62	1.93	1.41	3
Bertille Seyve 2667	16.7	17.5	15.4	1.50	1.65	1.31	4
Bertille Seyve 2862	14.8	17.4	12.2	1.61	1.76	1.43	4
Baco 1	18.9	21.2	15.4	1.75	1.83	1.71	4
Baco 43-23	20.8	21.4	19.4	1.40	1.55	1.34	3
Cartier 1	16.8	17.4	15.6	1.29	1.43	1.25	3
Humbert 1	15.1	15.9	14.8	0.86	0.99	0.85	3
Malegue 2049-3	19.0	20.1	17.4	0.82	0.99	0.74	3
Seyve Villard 5-276	20.6	22.0	18.9	1.01	1.23	0.93	5
Seyve Villard 12-622	14.3	15.4	13.4	1.58	1.78	1.39	3
Seyve Villard 14-287	21.2	24.6	19.0	1.22	1.42	1.02	4
Seyve Villard 18-315	16.7	20.6	13.2	1.49	1.64	1.26	4
Delaware	21.5	23.3	20.2	0.86	1.08	0.72	5
Concord	18.3	20.6	16.2	0.70	0.89	0.43	5
Catawba	17.8	19.0	16.4	1.28	1.59	0.77	5
Seneca	21.6	23.2	20.8	0.60	0.69	0.53	5
Niagara	16.8	19.2	14.7	0.57	0.69	0.51	5
Dutchess	19.0	20.2	18.0	0.76	0.89	0.68	5
Elvira	15.7	17.6	11.8	0.72	0.90	0.52	5
Iona	20.0	21.0	18.4	0.88	1.02	0.77	5

New York is concerned because of its rather weak habit of growth and exacting requirements for soil and culture.

The high acidity shown by many of the hybrids included in this study probably result from the fact that the hybridizers made extensive use of Vitis riparia, V. aestivalis, and V. rupestris in their breeding programs. The fruit of these species is naturally high in acid and this character has no doubt been transmitted to their seedlings even when they have been hybridized with varieties of V. vinifera. These hybridizers along with most people of European origin have an antipathy toward the labrusca or "foxy" type of flavor. Therefore they avoided the use of the labrusca species which might have given seedlings of lower acidity. None of the varieties included in this study showed any of the foxy flavor.

Many of these hybrid varieties produce juice which is highly colored and of course is best used for white wines in spite of the fact that it is a blue grape. Red fruited varieties included Seibel 14 and 5760. White fruited varieties included Seibel 4986, 5279, 7136; Baco 43-23, and Seyve Villard 5-276 and 14-287.

In conclusion it may be said that many of the French hybrid grape varieties are not well adapted for culture in New York State. Many require longer and probably warmer growing seasons than those prevailing at Geneva. Many produce fruit naturally low in sugar and very high in acidity. Others lack vigor. Most of those tested have been remarkably resistant to downy mildew, powdery mildew, and black rot though there have been several exceptions to this statement.

The outstanding performers have been Seibel 1000 and Seyve Villard 5-276, in the vineyards at Geneva and Fredonia. Others which have shown promise culturally and in wine trials include Seibels 2, and 5898 and Baco 1. The group as a whole offers its greatest promise to New York viticulturists as a source of varieties for high quality red wines which are in noticeably short supply in that area.