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BUNCH GRAPE VARIETY TRIALS IN EAST TEXAS

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Summary

Outstanding selections in the trial were Carman, Blue Lake, Mer 4-16C, Mer 29-60, Mer 4-19A-22, and Mer 4-1E. All of these grapes are relatively low in sugar, so their primary value is possibly for jelly or other home processing. Carman has been a recommended variety in East Texas for many years, and the fact that no other bunch grape exhibited superiority suggests that Carman should continue as an important variety for this region. Seibel 9110 looked best among varieties considered as table grapes. Arkansas 1016 and Golden Muscat also produced satisfactory quality table grapes, but yields have generally been only moderate and a good spray program is necessary to control black rot. Himrod, the only seedless selection in the trial, has had moderate to low yields of good quality grapes with a good spray program.

Introduction

Production of bunch grapes attracts considerable interest in East Texas although a commercial industry does not exist. Large-scale production is seriously hampered by black rot, and the potential for Pierce's disease is present. Black rot and other fungal diseases can be reasonably controlled with a thorough spray program. Pierce's disease results from a rickettsia-like organism, has no practical method of control, and can severely injure or kill vines. Leaf hoppers, a necessary insect vector for the spread of Pierce's disease, are common in much of East Texas.

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Disease resistance of bunch grapes is generally poor in Vitis vinifera, the primary species of European and California wine grapes, relatively good in American grapes, characterized by V. labrusca, and intermediate in French-American hybrids. Breeding programs in other areas have produced selections with reportedly good disease resistance--particularly to Pierce's disease. A vineyard was started at Overton to evaluate production, quality, and disease incidence of resistant selections, V. vinifera, American grapes, and hybrids. Results covering the first 3 years of production are reported here.

Materials and Methods

A vineyard that included all numbered selections as well as Blue Lake, Stover and Liberty was begun in December, 1974. Other varieties, including Golden Muscat, Schuyler, Himrod, and Seibel 9110, were added later that winter. Carman was planted in February, 1976.

Plants were set 10 feet apart in 10-foot rows with single replications of three plants of each variety. Fertilizer (12-12-12) was applied as a single late-winter application in the following amounts: none the first year, 0.5 pound (lb) the second, and 1.0 lb each year thereafter. All plants were trained to a two-wire vertical trellis and were pruned to the four-arm Kniffin system.

A trickle irrigation system was installed in spring 1975 and has been used each subsequent year.

All grapes were hand harvested. Berry size was recorded by averaging three replicate samples of 10 berries each. Cluster size was recorded as the average of three medium-size bunches.

Juice quality was determined from hand-squeezed samples. Ripe berries were placed in polyethylene bags and crushed against a hard surface. A 50-milliliter (ml) sample of juice was poured off and frozen for later analysis of soluble solids (S.S.), pH, and percent titratable acidity.

Percent S.S. (essentially sugars) was determined with one or two drops of juice on a hand refractometer. A glass electrode pH meter was used to record pH and to measure acidity.

Acidity was measured using 5-gram (g) samples of juice. The juice was brought to approximately 125 ml with distilled water; this solution was titrated to pH 8.2 with 0.1 N NaOH. Percent titratable acids are expressed as milliequivalents of tartaric acid.

Results and Discussion

Production -- Production data for 1977-79, the third through the fifth year for all selections, except Carman which is 1 year younger, are presented in Table 1. Almost half of the selections have exhibited outstanding production. Blue Lake, Mer 4-1E, Mer 4-19A-22, Mer 4-16C, and

Mer 2-1E have all surpassed 16,000 pounds per acre (lb/ac) in at least one of the years of the study. A few selections have failed to set good crops, and others such as Grenache and Petite Sirah have lost much of their crop to disease, particularly black rot.

Harvest -- Most selections in the test ripened in July (Table 1). Himrod was earliest each year with June 22, 1977 as the earliest harvest date. Harvest of all selections was completed by mid-August.

Bloom -- The date of bloom of these selections was generally in early May (Table 1). This is almost 1 1/2 months after the last average freeze date, so bloom date of selections is not a significant factor in choosing a variety.

Firmness -- Arkansas 1016 was rated as the firmest selection (Table 2). Carman, Seibel 9110, B3-83, and Liberty also received good firmness ratings. Selections judged especially soft included Mer 3-18A and Mer 2-12A-16. Firmness was not considered to be a problem in grapes rated above 5.0.

Peel Slip -- Most of the selections slipped from the peel with ease. Eighteen were rated 7.0 or above, indicating very good slippage (Table 2). Arkansas 1016 rated only a 2.5, but it has a palatable peel that is generally consumed with the pulp. Seibel 9110 did not slip well either, but has a palatable peel.

Peel Thickness -- Peel thickness was not a problem with any of the selections (Table 2). Arkansas 1016 and F 5-8 were judged to have the thickest peels; however, their peels were not objectionable. Twelve of the selections had peels thin enough to be rated above 8.0.

Attractiveness -- Attractiveness varied considerably among selections (Table 2). Mer 4-19A-22, with large, tight clusters of medium-size grapes, was rated highest at 8.7. Seibel 9110 and Mer 4-16C with ratings of 8.0 were also judged very attractive. Selections receiving the lowest ratings for attractiveness were those with particularly bad disease problems or especially loose, misshapen clusters. D 4-176, Grenache, Petite Sirah, and Stover rated lowest.

Disease -- Black rot was the chief limiting disease problem. All selections were sprayed from bloom to harvest each year with a program that included benlate or captan at approximately 2-week intervals. Selections with very little disease included Carman, Mer 29-60, Mer 4-19A-22, Mer 4-16C, and Mer 4-1E (Table 2). V. vinifera selections-- Petite Sirah and Grenach--were devastated by black rot in spite of the spray program. Black rot loss was also serious on Arkansas 1016 and Himrod.

Flavor -- Flavor ratings are strictly the opinion of the author and his assistant. Flavor ratings basically express the sweet or acid flavor of selections with sweet selections receiving a good rating and acid

selections receiving a lower rating. Golden Muscat received the highest rating (8.5), followed by Himrod (8.0) and Stover (7.7). Most of the selections tested tasted somewhat acid and were deemed better for jelly than for fresh consumption. Petite Sirah was judged lowest (Table 2) followed by Grenache, Ark 1016, Mer 3-18A, and F 4-16. The low flavor ratings also reflect poor disease resistance since these selections could not be left on the vine as long as others with greater disease tolerance.

Fruit Size -- Golden Muscat had the largest berries in the test (4.6 g/berry), followed by F 5-8 and Mer 16-12C (3.6 and 3.5 g/berry, respectively). Petite Sirah at 1.2 g/berry was smallest (Table 3). Golden Muscat, Mer 4-19A-22, and Arkansas 1016 had the largest clusters at 213, 202, and 184 g/cluster, respectively.

Soluble Solids -- Soluble solids were highest for B 3-83, D 4-167, and F 4-36 at 22.7, 22.3, and 21.9 percent S.S., respectively (Table 3). Many of the selections had appreciably less sugars, for example, only 12.6 percent in Mer 29-60 and Blue Lake.

Composite Rating -- Qualitative ratings in Table 2 were averaged to produce a composite rating. Firmness, peel slip, peel thickness, attractiveness, disease, and flavor were considered to be of equal importance in computing the composite rating. Carman had the highest composite rating (7.4), followed by Mer 29-60, Mer 4-1E, and Mer 4-16C, all at 7.3 (Table 2). Others with high composite ratings included Schuyler, Golden Muscat, Mer 4-19A-22, and Blue Lake.

Pierce's Disease -- All selections were evaluated for symptoms of Pierce's disease in November 1978 (Table 4). Based on the evidence available, no selection was judged to have Pierce's disease. It was felt that strong symptoms should be exhibited in at least three of the five categories presented in Table 4, which was not the case for any selection. Leaf hoppers, the necessary vector of Pierce's disease, have not been noted in the vineyard. Grenache and Petite Sirah were included in the planting as checks since they are highly susceptible to Pierce's disease; however, the only positive symptom either exhibited was a lack of vigor by Grenache.

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Table 1. Bunch grape production and bloom data at Overton, 1977-1979.

Variety	Yield lbs/ac			Harvest			Full Bloom
	1977	1978	1979	1977	1978	1979	1977
Stover	4669	8276	9801	7/14	7/25	7/31	4/29
Blue Lake	7623	14157	17424	7/28	8/6	8/4	4/30
Petite Sirah	220	1220	4356	7/20	7/20	7/30	5/08
Grenache	0	2396	1089	--	7/24	7/30	--
Ark 1016	4378	12502	0	7/7	7/22	--	5/08
Mer 1-9B	0	0	10890	--	--	8/15	5/03
Mer 2-1E	4961	2940	16335	8/2	8/9	8/8	5/12
Mer 2-12A-16	7623	2156	8276	7/11	7/20	7/24	5/03
Mer 3-18A	0	0	13068	--	--	8/12	5/12
Mer 4-1E	0	7623	17424	--	8/9	8/4	5/08
Mer 4-16C	0	17424	9801	--	8/10	8/12	5/03
Mer 4-19A-22	15760	18077	9438	7/22	7/24	8/4	5/12
Mer 16-12C	7550	12342	5372	7/17	7/24	7/30	5/03
Mer 29-60	8422	8494	11616	7/20	8/9	8/4	4/26
B 3-83	6244	5445	6534	7/25	8/1	7/26	5/09
F 4-36	0	1307	7841	--	7/24	7/30	5/09
F 4-16	6098	7187	871	7/25	8/9	8/12	5/10
F 5-8	14592	7405	11979	7/20	8/9	7/30	5/08
Liberty	3340	4472	6534	7/20	8/6	8/5	5/09
D 4-176	0	2091	290	--	7/20	7/30	5/02
Golden Muscat	0	2178	6970	--	7/24	7/24	5/07
Seibel 9110	4056	15028	6316	7/16	7/24	7/31	5/08
Himrod	220	4719	2904	6/22	6/27	7/2	5/01
Schuyler	0	9583	5663	--	6/30	7/17	--
Carman	2759	6679	14520	7/20	8/3	7/24	5/09

Table 2. Bunch grape qualitative evaluations at Overton. Data are averages for 1977-1979.

Variety	Color	Firm- ness	Peel Slip	Peel Thickness	Attract- iveness	Disease	Flavor	Composite Rating
Stover	white	7.0 ^{1/}	8.0	7.7	4.7	6.3	7.7	6.9
Blue Lake	purple	5.5	8.0	7.5	7.0	7.5	7.0	7.1
Petite Sirah	purple	6.0	6.7	8.3	4.3	2.0	4.3	5.3
Grenache	purple	7.0	6.5	8.0	2.5	2.0	5.0	5.2
Ark 1016	white	8.5	2.5	6.0	7.0	4.5	5.0	5.6
Mer 1-9B	white	6.0	9.0	8.0	7.0	6.0	6.0	7.0
Mer 2-1E	purple	6.3	7.7	7.0	6.7	7.7	6.0	6.9
Mer 2-12A-16	white	4.3	7.7	7.7	5.3	4.7	7.0	6.1
Mer 3-18A	white	4.0	8.0	8.0	5.0	6.0	5.0	6.0
Mer 4-1E	purple	7.0	8.0	8.5	6.5	8.0	5.5	7.3
Mer 4-16C	white	5.0	8.0	8.5	8.0	8.0	6.0	7.3
Mer 4-19A-22	purple	5.7	7.3	7.7	8.7	8.0	5.3	7.1
Mer 16-12C	red	6.7	7.7	7.7	6.7	6.0	6.3	6.9
Mer 29-60	purple	7.0	8.0	7.0	7.7	8.0	6.3	7.3
B 3-83	white	7.3	7.0	8.0	6.0	6.0	6.0	6.7
F 4-36	red	7.0	3.5	7.0	5.0	5.5	7.5	5.9
F 4-16	red	7.0	7.0	7.0	6.5	6.0	5.0	6.4
F 5-8	red	5.3	5.0	6.3	5.3	5.7	7.3	5.8
Liberty	red	7.3	7.7	8.3	5.0	5.7	6.7	6.8
D 4-176	purple	5.0	6.0	8.0	2.0	7.0	6.0	5.7
Golden Muscat	white	5.5	8.0	8.0	7.0	6.0	8.5	7.2
Seibel 9110	white	7.3	5.0	8.0	8.0	6.0	7.3	6.9
Himrod	white	5.7	8.0	8.0	5.7	4.7	8.0	6.7
Schuyler	purple	7.0	8.0	8.0	6.0	7.0	7.0	7.2
Carman	purple	7.3	8.0	7.3	7.3	8.0	6.7	7.4

^{1/}1 = poor, 10 = excellent.

Table 3. Bunch grape size and quality characteristics at Overton. Data are averages for 1977 and 1978.

Variety	Fruit size		S.S. %	pH	Acid %
	g/berry	g/cluster			
Stover	1.5	46	15.3	--	--
Blue Lake	2.2	105	12.6	--	--
Petite Sirah	1.3	73	13.9	3.2	1.33
Grenache	2.1	91	17.7	--	--
Ark 1016	2.8	184	14.7	--	--
Mer 1-9B	-	-	--	--	--
Mer 2-1E	1.5	55	17.9	--	--
Mer 2-12A-16	1.5	80	15.2	3.3	0.93
Mer 3-18A	-	-	--	--	--
Mer 4-1E	1.7	151	17.6	--	--
Mer 4-16C	2.0	155	16.3	--	--
Mer 4-19A-22	1.9	202	14.4	3.4	0.89
Mer 16-12C	3.5	125	14.0	3.4	0.91
Mer 29-60	3.1	125	12.6	3.5	0.89
B 3-83	1.9	119	22.7	--	--
F 4-36	2.1	90	21.9	--	--
F 4-16	2.5	145	14.8	--	--
F 5-8	3.6	152	14.1	3.4	1.01
Liberty	2.1	82	17.7	3.6	0.64
D 4-176	2.2	79	22.3	--	--
Golden Muscat	4.6	213	15.9	--	--
Seibel 9110	2.8	147	14.8	3.7	0.95
Himrod	-	-	--	--	--
Schuyler	-	-	--	--	--
Carman	1.6	106	15.1	3.7	0.49

Table 4. Evaluation of Pierce's disease symptoms on bunch grape selections at Overton, 1978.

Variety	Criterion for Evaluation				
	Marginal ^{1/} burn	Leaf ^{2/} Abscission	Cane ^{3/} Die-back	Cane ^{4/} Spotting	Vigor ^{5/}
Stover	10 ^{6/}	10	8	9	9
Blue Lake	-	-	6	10	8
Petite Sirah	10	10	9	9	8
Grenache	9	9	10	9	5
Ark 1016	9	10	9	9	10
Mer 1-9B	-	-	4	-	5
Mer 2-1E	9	10	10	10	8
Mer 2-12A-16	-	-	9	10	7
Mer 3-18A	10	10	10	9	10
Mer 4-1E	10	10	9	9	7
Mer 4-16C	9	10	10	10	8
Mer 4-19A-22	10	10	10	10	10
Mer 16-12C	9	10	7	9	9
Mer 29-60	9	9	10	10	10
B 3-83	9	10	10	9	10
F 4-36	10	9	10	10	10
F 5-8	10	10	10	10	9
Liberty	9	10	10	10	9
D 4-176	10	10	10	10	9
Golden Muscat	6	10	8	9	7
Seibel 9110	10	10	10	10	9
Himrod	9	9	7	9	8
Schuyler	10	10	6	9	6
Carman	-	-	10	9	9

^{1/}Marginal burn -- particularly double burn of leaves.

^{2/}Abscission of leaf blade from petiole with drying of terminal part of the petiole.

^{3/}Dieback of canes.

^{4/}Green, immature areas within otherwise hardened sections of canes.

^{5/}Overall vigor of cane growth.

^{6/}1 = severe symptom, 10 = no symptom.