

Yield and quality of *Vitis vinifera* wine grape cultivars in Arkansas

R. K. Striegler and J. R. Morris

THE PARAMETERS most often used to determine optimum harvest time for wine grapes in Arkansas are percent soluble solids and percent acidity. Recently, pH has been added as an important parameter for monitoring maturation because of its effect on wine stability. White wines with a pH above 3.4 or red wines above 3.5 may have stability problems.

A study was conducted to evaluate fruit maturity parameters and to determine maturation rates in 1979 and 1980 of six major *Vitis vinifera* wine grape cultivars grown in the state's main wine-producing region. Yield data were collected because of the influence of yield on quality and cultivar selection.

The study was conducted in an own-rooted commercial vineyard at Altus, established in 1973 and trained to a bilateral cordon. Vines were spur pruned to 70 nodes each year. Vines were spaced 1.83 m (6 ft) in the row and 3.66 m (12 ft) between rows. Two replications of each cultivar consisted of three mature, uniform vines. (See table for cultivars and sampling dates).

Each sample consisted of at least 200 randomly selected berries from each replication which were sealed in polyethylene bags and frozen for later analysis. Thawed samples were blended for 30 seconds, then heated for one hour at 85°C in a water bath, cooled at room temperature and squeezed through two layers of cheesecloth. Juice was centrifuged for 10 minutes at 2100 g. for quality analysis. The experiment was designed as a 6 x 3 factorial (six cultivars x 3 sampling dates) with each year analyzed separately.

The highest yielding cultivars in 1979 - a cool, wet season - were Petite Sirah and Cabernet Sauvignon. In 1980 - a hot, dry season - Pinot noir had the highest yield. However, all had commercially acceptable yields (above 8 MT/ha) both years. Some of the cultivars were allowed to overproduce. In cases where this occurred, 70 nodes were too many. Therefore, fewer nodes should be retained and/or cluster thinning will be required for crop load control with some of these cultivars.

Examination of the interaction of cultivar x sampling date shows that rate of increase in % soluble solids and acidity of all cultivars was fairly constant in 1979 (see table). However, there were significant interactions for pH in 1979. The pH of Pinot noir and White Riesling did not increase as much as it did in the other cultivars between the second and third sampling dates.

During the hot, dry year of 1980, White Riesling and Pinot noir did not show the expected increases in % soluble solids between the 2nd and 3rd sampling dates. It is possible that 14.6 MT/ha and 28.3 MT/ha, respectively, were excessive loads for these cultivars under climatic conditions of 1980.

In 1980, the acidity of Chardonnay decreased and pH increased to a greater extent between the 1st and 2nd sampling dates compared to the other cultivars. Petite Sirah, Pinot noir and White Riesling were the best of the cultivars in maintaining a low pH between the 2nd and 3rd sampling dates during 1980. An extremely high pH and low acidity occurred with Gewürztraminer in both the 1979 and 1980 season and Pinot noir had an extremely high pH in 1980. Previous research has shown that grape samples blended in a Waring Blender can be as much as 0.3 units higher in pH than samples cold pressed by a commercial wine press. The use of a nonblending method for sample preparation of the white cultivars would have given more representative pH values. However, even after considering a reduction of the pH values of the white cultivars by 0.3, excessive pH values occurred by the final harvest of Gewürztraminer in both years and with Chardonnay in 1980.

With some cultivars, over-cropping might have contributed to low % soluble solids. The hot, dry year of 1980 was extremely damaging to pH and acidity levels.

Consistent differences in quality parameters during ripening were observed among most cultivars, and further investigation is needed to determine their influence on wine quality. The pH of the wine may be different from the pH of the raw product depending largely on the potassium level, malic acid level, and the buffering capacity of the grapes. Therefore, additional research is needed to relate the final wine pH to the raw product pH of these cultivars produced under Arkansas climatic conditions. However, it is important that Arkansas wineries closely monitor the fruit pH level and use this parameter as one of the major factors in determining optimum harvest time. Adequate soluble solids are attained at the expense of desired acidity and pH.

Effects of Cultivar and Sampling Date on Raw Product Quality of *Vitis vinifera* Wine Grapes in 1979 and 1980.

Cultivar and Sampling Date		1979				1980			
		Yield ¹ (MT/ha)	Soluble solids (%)	Acidity (%)	pH	Yield (MT/ha)	Soluble solids (%)	Acidity (%)	pH
Red									
Cabernet Sauvignon									
8/8	8/11		14.6	1.21	3.20		17.0	0.78	3.49
8/22	8/20		16.7	0.91	3.43		18.0	0.72	3.56
9/4	9/3	17.9	18.5	0.65	3.58	15.2	20.5	0.61	3.67
Petite Sirah									
8/8	8/11		14.5	1.22	3.29		15.0	1.00	3.51
8/15	8/20		16.4	1.05	3.40		17.2	0.82	3.70
8/22	8/27	18.4	17.2	0.88	3.52	20.4	19.3	0.79	3.75
Pinot noir									
8/1	8/1		12.9	1.54	3.30		15.4	0.95	3.70
8/8	8/8		16.1	1.10	3.53		18.6	0.73	4.02
8/15	8/15	14.5	17.2	0.99	3.61	28.3	19.5	0.62	4.06
White									
Gewürztraminer									
8/1	7/23		14.8	0.94	3.35		13.0	1.08	3.50
8/8	8/1		18.1	0.70	3.56		15.1	0.73	3.74
8/15	8/11	13.2	20.4	0.53	3.74	11.8	18.4	0.56	3.98
White Riesling									
8/1	8/1		14.1	1.37	3.10		11.2	1.20	3.20
8/8	8/11		16.7	1.07	3.27		14.0	0.86	3.37
8/15	8/27	9.6	17.4	0.81	3.36	14.6	14.9	0.75	3.41
Chardonnay									
8/1	7/23		14.6	1.12	3.37		12.2	1.63	3.25
8/6	8/6		16.7	0.91	3.50		17.7	0.83	3.66
8/15	8/19	11.4	19.0	0.78	3.69	18.0	21.8	0.66	3.66
LSD @ 5%		1.0	NS	NS	0.04	5.4	1.6	0.20	0.11

¹Metric tons/hectare + 2.24 = tons/acre