

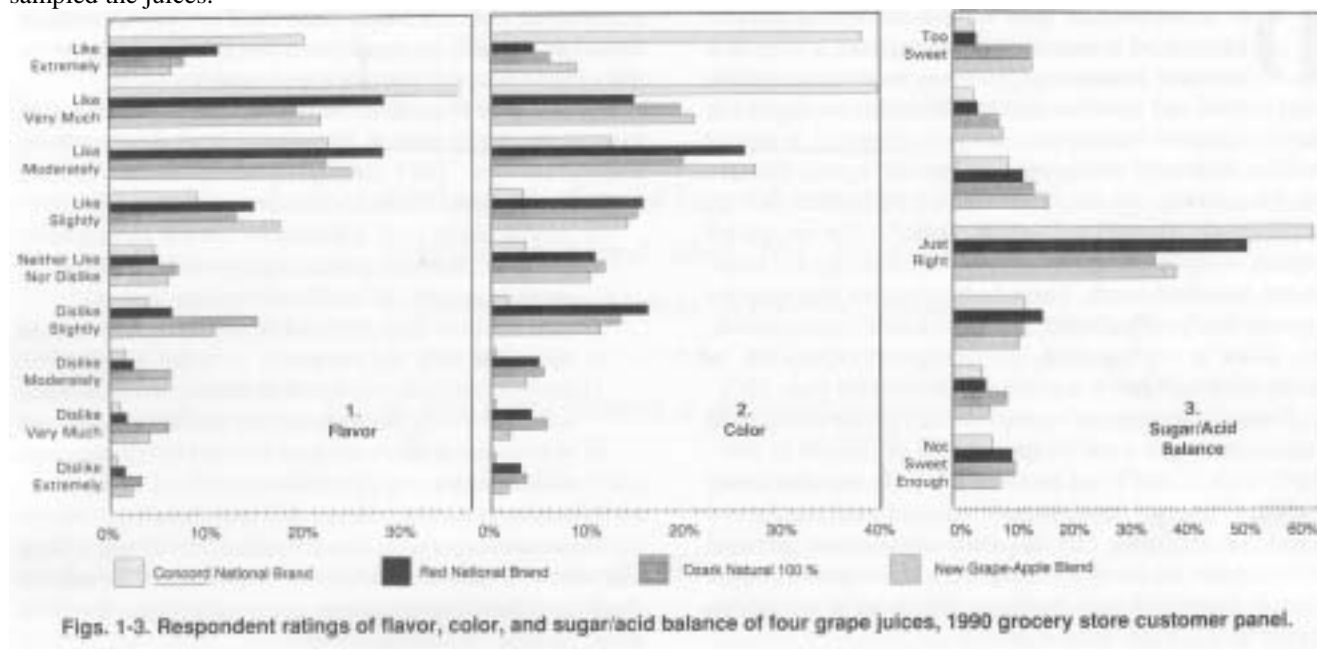
ARKANSAS TABLE GRAPE JUICE EVALUATED

C. Price and J.R. Morris

Consumer tests were conducted in grocery stores in 1989 and 1990 to evaluate grape juices developed from Arkansas' seedless table grape cultivars. The grape juices were developed to find a market alternative and utilization for table grapes which, because of grape cosmetics and/or marketing acceptance conditions, could not be sold as a fresh product. The juices consumers tested were the new "Ozark Natural 100%" brand and a grape/ apple blend of this brand. Grapes for the juices were produced by the Ozark Table Grape Growers Association, Inc. (OTGGAI), with more than 97% of the raw product from 'Venus' grapes.

In both 1989 and 1990, grocery store customers were asked to rate the flavor and color of the new OTGGAI juices against two nationally established market brands: a purple 100% Concord grape juice and a red blend of grape juices. The OTGGAI juices have a bright red color and are relatively transparent in contrast to the opaque appearance of the national brands tested and almost all other brands of grape juice. The 1989 tests were conducted using a "product blind" technique in which a 3-digit code was used to identify the juices. In the 1990 tests, an OTGGAI grape apple blend and a rating for sugar/acid balance were added. Also, the "double blind" technique was used; the interviewers administering the tests as well as the tasters knew them only by the 3digit code identification.

Interviewers for the 1989 test were recruited from personnel associated with the project. In 1990, the double blind technique required that interviewers be unfamiliar with the project. Respondents were asked to taste and assign a relative rank to the flavor and color of the juices using the 9-point hedonic or "pleasantness" scale (Fig. 1 and 2). The sugar/acid balance rating in the 1990 test was on a relative seven-point scale (Fig. 3) ranging from too sweet to not sweet enough. To minimize order bias, the sequence of tasting and viewing was re-randomized by balanced procedures after each respondent sampled the juices.



Figures 1 and 2 illustrate the dominance of the Concord national brand. In 1990 the grape/apple blend received higher ratings for color than the red national brand for the like extremely and like very much categories. The sugar/acid balance ratings in 1990 showed there was a peak in preferences for all the grape juices near the "just right" level (Fig. 3). Many respondents made comments confirming earlier laboratory and controlled taste tests that the new juice flavors were "crisp and tangy" and possessed marketable qualities.

Statistical analyses were made using a Non-parametric Analysis of Variance one-way technique and the Kruskal-Wallis test (Table 1). This procedure evaluates the ranking (ordinal values) without assigning discrete numbers (cardinal values). This allows statistical testing without conveying a sense of fixed spacing between preference rating categories.

The Chi-square coefficients which the analysis provided indicated significant variations from the expected in the mean scores of relative rankings within the total sample (Table 1). The tests of mean scores of flavor ratings revealed that the national brand juices were significantly different from one another and from the OTGGAI brands in both the 1989 and

Table 1. Average values of preference ratings for flavor, color and sugar/acid balance of grape juices in grocery store tests, 1989 and 1990 (Kruskal-Wallis Test: Chi-square Approximation).

Item	Grape Juices	Years	
		1989 [†]	1990 [†]
----- Mean Score [‡] -----			
A. Flavor Preference Ratings (Relative Scale)	Concord 100%	2191.66 [†]	2046.97 [†]
	Red 100%	1826.07 [†]	1743.21 [†]
	OTGGAI Blend	---	1440.34 [†]
	Ozark Natural 100%	1511.54 [†]	1355.48 [†]
	Chi-Square Coef. [No. of Respondents]	265.35 [§] 1228	281.35 [§] 823
B. Color Preference Ratings (Relative Scale)	Concord 100%	2425.52 [†]	2413.12 [†]
	Red 100%	1610.09 [†]	1289.39 [†]
	OTGGAI Blend	---	1541.69 [†]
	Ozark Natural 100%	1348.06 [†]	1333.79 [†]
	Chi-Square Coef. [No. of Respondents]	735.36 [§] 1199	774.78 [§] 822
C. Sugar/Acid Balance Ratings (Relative Scale)	Concord 100%	---	1559.39 [†]
	Red 100%	---	1510.97 [†]
	OTGGAI Blend	---	1806.80 [†]
	Ozark Natural 100%	---	1692.84 [†]
	Chi-Square Coef. [No. of Respondents]	---	54.61 [§] 821

[†]Significant mean separation ($\alpha = 0.05$) from other scores within the test year.

[‡]Non-significant mean separation from scores having ‡ symbol.

[§]Probability of larger Chi-Square = 0.0001

[†]Tests conducted in one supermarket in Searcy and Clinton, AR, Sept. 7-9, 1989, and Little Rock and Hot Springs, AR, Sept. 21-23, 1989.

[†]Tests conducted in three supermarkets in Fayetteville, AR, Nov. 1-3, Nov. 8-10, and Nov. 15-17, 1990.

[‡]Mean of the rank of observations 1 to n; response: like extremely to dislike extremely.

year (Table 1). Variations observed between test locations in 1989 were minimized so as to be non-significant for all test sites in 1990. The statistical tests indicated that flavor preferences among juice varieties tended to be significantly influenced by order of presentation in both years. However, there was no order-variety interaction, and co-variance analysis revealed that the randomization of presentation had balanced any potential order bias. Because this procedure verified the consistency of the data, the flavor, color, and sugar/acid balance preference ratings would be judged as valid estimates.

Ratings for color and flavor for the new juices tended to be concentrated in the "like" preference categories and above "neither like nor dislike" or indifferent. Therefore, it was judged that favorable ratings outweighed negative responses. Also, market potentials for these new juices should be indicated by the ratings relative to the national brands. Marketing potentials should exist for the new OTGGAI juices if the product can be supplied at a competitive price.

1990 tests. However, there was no significant difference between flavor mean scores for the Ozark Natural 100% and the grape/apple blend of this juice in the 1990 tests. The order of ratings of flavor preferences tended to be parallel in each year, with the Concord juice as the first choice and the red national brand as second choice, followed by the OTGGAI blend juice (1990 only) and the Ozark Natural 100% grape juice.

Changes between years in the rating of preferences for color could be explained by both relative comparisons and improvements in processing. In 1989 the mean score for color showed that the three juices were significantly different (Table 1). However, the 1990 color mean scores indicated that there was no significant difference between the ratings for the red national brand and the Ozark Natural 100%. The first choice of the Concord national brand in both years can be related to the expressed consumer expectations of a dark purple color or "what grape juice is supposed to look like."

Even though there was a clustering near the "just right" category for all juices in the sugar/acid balance in the 1990 test (Fig. 3), the mean score tests revealed significant differences between the Ozark Natural 100% and the grape/apple blend and the national brands. The sugar/acid balance test could be one of the strongest points indicating the OTGGAI grape juices fall within the market acceptance range.

Because some respondents failed to give complete ratings for either color, flavor, or sweetness, the number of participants varied between tests within each

Dr. Price is a professor in the Department of Agricultural Economics and Rural Sociology and Dr. Morris is a University professor in the Department of Food Science. Support was provided by the Federal State Market Improvement Project, USDA-AMS and the Ozark Table Grape Growers Association, Inc.